MARINE REVIEW

WEEKLY.] AND MARINE RECORD. [ESTABLISHED, 1878.

Vol. XXVII | Published every Thursday at 39-41 Wade Bldg by the Marine Review Pub. Co. | CLEVELAND, O., MAR. 19, 1903. | Subscription $3.00 year. Foreign $4.50 year. Single Copy 10 cents. | No. 12

Eastern Office, 1023 Maritime Bldg., New York City
Chicago Office, 373 Dearborn St.
[Entered at Cleveland Post Office as second-class matter.]

NAVAL MONUMENT AT SAN FRANCISCO.

The first permanent monument to commemorate Admiral Dewey's victory at Manila bay and to pay tribute to the sailors of the American navy is being erected on Union square in the heart of San Francisco. There is a special appropriateness in locating the monument in San Francisco, for it is the city which faces the orient and is as well the city in which Admiral Dewey's flagship, the Olympia, was built. The contract for the monument was awarded last year to Robert I. Aitken, sculptor, and Newton J. Tharp, architect. The design submitted consists of a granite shaft, 83 ft. in height, at the base of which are four emblematic bronze figures, 8 ft. in height. Surmounting the shaft will be a bronze figure of Victory, bearing in one hand the trident and in the other a laurel wreath. The colossal figure of Victory is shown in the accompanying illustration. Ground was broken for the shaft in May, 1901, by the late President McKinley during his visit to the coast. The shaft, designed by Mr. Tharp, is of plain granite with a capital somewhat after the Corinthian order but original in treatment. The estimated cost of the monument is $45,000, the amount having been raised by popular subscription. The figure of Victory has already brought Mr. Aitken much praise. He is only twenty-four years old and the effort is extremely ambitious.

WORLD'S WASTAGE OF VESSELS.

The returns of vessels lost and condemned during the quarter ended Sept. 30, 1902, have just been issued by Lloyd's register. The figures given take in vessels reported up to Feb. 10 of this year, excluding in all cases vessels of less than 100 net tons. Dealing first with steamers, thirty-seven of these, aggregating 46,251 tons gross, were lost during the period named. Of these nearly two-thirds, or twenty-three vessels of 33,251 tons, were wrecked, the next heaviest item coming under the head of collision, which claimed five steamers of 5,374 tons. Of the remainder, two were abandoned, one was burned, four foundered and two are missing. In regard to losses of steamships France suffered least, proportionately, her one ship of 105 tons representing .01 per cent. of her gross steam tonnage. Spain also lost one steamer of 191 tons and with it .03 per cent. of her steam tonnage. Great Britain lost eleven ships of 13,029 tons representing .1 per cent. of her steam tonnage. The British colonies were proportionately the heaviest losers, their five ships of 7,334 tons lost equalling .97 per cent. of their tonnage.

In the matter of sailing ships the returns are more unfavorable, including as they do particulars of ninety-five ships, aggregating 59,781 tons, which passed out of existence in the quarter. Of these, however, eleven of 8,064 tons were broken up or condemned. Of the remainder, fifty-two of 29,974 tons were wrecked, ten of 6,134 tons were abandoned, nine met their end by collision, eight are missing, four foundered and one was burned. Of the sailing ships lost, roughly one-quarter, in tons, were British, to which nationality nine of the ships of 10,845 tons are credited. The United States has the best position with losses, equaling .36 per cent., and Austria worst with 2.41 per cent. In actual tons lost Norway heads the list with seventeen sailers, three of which were abandoned at sea, totalling 11,181 tons, and representing 1.46 per cent. of her holding in sailing tonnage.

SHIP BUILDING IN GERMANY.

During the year 1902 the ship building yards of Germany turned out altogether 227 steamers with a gross registered tonnage of 212,233 tons and 280 sailing vessels of 58,715 tons. The steamers show a falling off, as compared with 1901, of three ships and 49,000 tons. This falling off becomes all the more striking in view of the fact that at the beginning of 1903 only 121 steamers of 255,977 tons remained in course of construction, as against 142 steamers of 317,080 tons at the end of 1901, and 152 steamers of 321,397 tons at the end of 1900. In the case of sailing ships there was an increasing tendency at the beginning of 1902, although the same volume of tonnage was turned out in German yards in 1901 as in 1900, for in January, 1902, there were building ninety-four sailing ships of 30,190 tons, or an increase of 11,000 tons as compared with 1901. In 1902 there was turned out an increase of sixty-nine sailing ships of 28,000 tons, as against the production in 1901, and at this moment there are 114 sailing ships of 22,310 tons in course of construction. But, these figures must be modified in several respects in order to arrive at the increase of tonnage in the mercantile marine of Germany. Firstly, there must be deducted the eleven warships, which were completed last year, and also the eighteen warships which are still under construction. Secondly, there must be deducted river craft, small sailing vessels under 100 tons, tugboats, lighters, ice-breakers, dredgers, etc. The turnout of larger vessels, since and including 1900 is seen in the following table:

	Steamers.	Tonnage.	Sailing ships.	Tonnage.
1900	63	213,894	24	11,258
1901	63	210,218	15	5,813
1902	55	161,833	11	11,525

In course of construction:

	Steamers.	Tonnage.	Sailing ships.	Tonnage.
At end of 1900	58	233,209	11	6,851
At end of 1901	56	230,743	9	9,563
At end of 1902	50	177,351	15	7,958

Of this total production there were built for foreign ship owners eight large steamers of 20,811 tons in 1902, and twelve large steamers of 40,651 tons, including eight warships of 23,238 tons. In 1902 one warship of 4,759 tons was built for a foreign power. Meanwhile the steamers built abroad to the order of German shipowners are as follows:

	Steamers.	Tonnage.
1900	25	99,888
1901	26	105,122
1902	16	37,374

Two steamers of a total tonnage of 3,000 tons are now being built abroad for German owners. The decrease in the activity in German ship building during 1902 was due to the fact that owing to the general depression in trade throughout Germany, the steamship owners were compelled to reduce their orders for new vessels.

STRIKE IN NEW YORK SHIP YARD SETTLED.

Boilermakers at the ship yard of the Townsend & Downey Ship Building & Repair Co., Shooter's island, New York, struck last week and the boilermakers in other yards went out in sympathy with them. The New York branch of the National Civic Federation quickly settled the sympathetic strike and the men returned to work on Wednesday of this week. Moral suasion alone was the method adopted. The federation then turned its attention to the original strike but the ship building company had settled it pretty thoroughly itself by aggressive action. The utmost activity was displayed by the ship building company in filling the places of the strikers as soon as they left, to the end that the men themselves, losing heart in the strike, voluntarily returned to work.

The naval board of construction has determined that the three new 16,000-ton battleships, authorized by the last naval appropriation bill, shall be identical with the Connecticut and Louisiana types as to armor and armament, the only difference being that the upper portion of the belt armor, which is 11 in. on those two ships, shall be 10 in. on the new vessels, and that the superstructure armor shall be increased from 6 to 7 in. Preliminary to the determination of the type of the new 13,000-ton battleships it has been decided to prepare sketch plans for fast 22-knot ships and slow 17-knot ships.

Percy & Small, Bath, Me., are stretching the keel for a large wooden schooner. She will be a six-master, the third to be built by this enterprising firm, and will be 275 ft. long.

SHIPPING LETTER FROM SCOTLAND.

Lower Wages in the Ship Yards, but Higher Prices for Material—Output of Scotch Builders in February—Changes in Shipping Regulations Recommended to Parliament—Miscellaneous Matters.

Glasgow, Mar. 9.—Although a settlement has not yet been effected in the matter of machinists' wages in the engine shops, work is proceeding steadily in the ship yards and engine works. The conference between the executives of the Federation of Engineering Employers and the Amalgamated Society of Engineers is only now being held. Under the circumstances the Clyde employers put forward the date of the proposed reduction in wages, so that no disagreeable element is introduced into the relations between the two bodies. An amicable arrangement is expected. Meanwhile the "black squad" and the "white squad" in the ship yards on the Clyde are working steadily on the reduced basis. The position of the ship builders, however, has not really improved since the wages were reduced, because the cost of material has gone against them. Pig iron has steadily risen during the last three weeks, partly as the result of a large bull movement in warrants and partly in response to a legitimate and increasing demand—increasing at all events as far as foreign requirements are concerned. How far this will go no one, of course, can foresee, though some people here are predicting a higher price for pig iron than has been known for years. But the immediate effect is to stiffen the prices of plates and other ship building material at the very time when ship builders are most anxious to get down costs in order to obtain more orders. It is an unfortunate state of affairs for them, though iron smelters rejoice in the big rise in pig iron while coal is coming down.

The number of contracts booked by Scotch ship builders in February were rather larger than the first estimate and seem to have aggregated about 30,000 tons. The most important of the month's orders were secured by the Clyde Ship Building & Engineering Co., Ltd., Port Glasgow, who are to build and engine two passenger and cargo steamers, each 350 ft. in length, for Elder, Dempster & Co. and also two passenger and cargo steamers, 235 and 240 ft. in length respectively, for the Goole Steamship Co. The hull of one of the latter will be built by Archibald Macmillan & Son, Ltd., Dumbarton, but the Clyde company will supply all the engines. D. J. Dunlop & Co., Port Glasgow, are to build another steamer for Elder, Dempster & Co.; Russell & Co., Port Glasgow, two steamers of 7,000 tons for Glasgow owners; A. Rodger & Co., Port Glasgow, a steamer to carry 6,000 tons, also for local owners; John Reid & Co., Ltd., Whiteinch, a ferry steamer for Clyde; Gourlay Brothers & Co., Dundee, a steamer of 830 tons for the Great Eastern Railway Co.; and the Greenock & Grangemouth Ship Building Co., Grangemouth, a small coasting steamer for English owners. It is reported from Montreal that the Canadian Pacific is to have built on the Clyde four steamers, each of 10,000 tons, as an addition to the Beaver fleet, which they have acquired.

FEBRUARY OUTPUT OF SCOTCH SHIP YARDS.

It will be of interest to note here briefly some items of the February output of the Scotch ship yards. Among the steamers there were the Narragansett, an oil-carrying steamer of 9,200 tons, with engines of 5,500 I. H. P., built and engined by Scott & Co., Greenock, for the Anglo-American Oil Co., Ltd.; Dorset, twin-screw steamer of 7,000 tons, with triple-expansion engines of 4,200 I. H. P., built by John Brown & Co., Ltd., Clydebank, for the Federal Steam Navigation Co., Ltd., London; Kyarra, twin-screw steamer of 6,976 tons, with engines by Denny & Co., built by William Denny & Brothers, Dumbarton, for the Australasian United Steam Navigation Co., Ltd.; Cranley, screw steamer of 4,500 tons, built and engined by D. & W. Henderson & Co., Ltd., for London owners; Charon, screw steamer of 2,350 tons with triple-expansion engines of 1,700 I. H. P., built and engined by the Caledon Ship Building & Engineering Co., Dundee, for the Ocean Steamship Co., Liverpool; Antoine Fraissinet, screw steamer of 1,900 tons with engines by Cooper & Greig, Dundee, built by the Grangemouth & Greenock Ship Building Co., Greenock, for French owners; Baron Kelvin, screw steamer of 1,500 tons with engines by Dunsmuir & Jackson, built by Charles Connell & Co., Glasgow, for Glasgow owners; Findhorn, screw steamer of 1,160 tons with engines by David Rowan & Co., Glasgow, built by the Ailsa Ship Building Co., Ltd., Troon, for William Sloan & Co.'s Glasgow and Bristol coasting trade; Batavier VI., screw steamer of 1,200 tons, with triple-expansion engines of 1,100 I. H. P., by Hutson & Sons, Glasgow, built by Mackie & Thomson for Rotterdam owners; Thisbe, screw steamer of 950 tons, built by the Dundee Ship Builders' Co., Dundee, for French owners; Blanche, screw steamer of 374 tons, with compound surface-condensing engines by Ross & Duncan, Glasgow, built by the Ailsa Ship Building Co., Ayr, for Liverpool owners; Orion, screw steamer of 300 tons, with engines of 400 I. H. P., built by John Fullerton & Co., Paisley, for Irish owners; Tees, screw steamer of 280 tons, built by the Ardrossan Ship Building Co., for Hull owners; Jennie and Jane, screw steamers, each 223 tons, with compound surface-condensing engines by Fisher & Co., Paisley, built by Scott & Sons, Glasgow, for English owners; Bosphorus 47 and Bosphorus 48, paddle steamers, each of about 220 tons, built and engined by the Fairfield Ship Building & Engineering Co., Ltd., for the Chirket Hairie Co., Constantinople; H. M. S. Provider, screw steamer of 200 tons, with engines of 300 I. H. P., built and engined by Bow, McLachlan & Co., Ltd., Paisley, for the British government; Bosphorus 46, screw steamer of about 100 tons, built and engined by the Fairfield Ship Building & Engineering Co., Ltd., Govan, for the Chirket Hairie Co., Constantinople.

Of steam yachts there were the Katoomba of 760 tons, yacht measurement, with four-cylinder, triple-expansion engines by Dunsmuir & Jackson, Ltd., built by Ailsa Ship Building Co., Troon, for Mr. Kenneth M. Clark, Paisley; Mantanza III., of about 150 tons, with engines by Muir & Houston, Ltd., Glasgow, built by George Brown & Co., Greenock, for Sir John Denison Pender, K. C. M. G.

Of dredges, tugs, etc., were the T. C. C. bucket dredger No. 6 of 500 tons and 600 I. H. P., built by Fleming & Ferguson, Ltd., Paisley, for the Tees Conservancy Commissioners; Vigilant, twin-screw tug of 345 tons, with triple-expansion engines of 800 I. H. P., by David Rowan & Co., Glasgow, built by Messrs. Murdoch & Murray, Port Glasgow, for the Mersey docks and harbor board; hopper barge of 257 tons, built by Lobnitz & Co., Renfrew, for foreign owners; stern-wheel steamer of 95 tons and 130 I. H. P., built by Ritchie, Graham & Milne, Glasgow, for foreign owners.

Among fishing vessels are the Fort William, steam trawler of 200 tons with engines of 320 I. H. P., built and engined by Hall, Russell & Co., Ltd., Aberdeen, for the Aberdeen United Steam Fishing Co., Ltd.; Conductor and Companion, steam trawlers, each of 185 tons, with triple-expansion engines of 350 I. H. P., built and engined by Hall, Russell & Co. for Newhaven owners; Loch Garry, steam trawler of 176 tons and 560 I. H. P., built by Alex. Hall & Co., Aberdeen, for the Empire Steam Fishing Co., Aberdeen.

BRITISH CAPTAINS FEAR MORGAN ENCROACHMENTS.

I don't know whether you have on your side anything corresponding to our Merchant Service Guild, the annual meeting of which was held a few days ago. The Merchant Service Guild is admittedly the most powerful organization of its kind in the world, having a membership of over 9,000 British captains and officers. Reference was made at the meeting to the hopeless disorganization of the present marine staff of the board of trade, and it was stated that what the premier industry of the country desired was proper recognition by the appointment of a minister of marine. Alluding to the Morgan shipping combine, the guild's report stated that this gigantic undertaking was organized under the laws of the state of New Jersey and some public feeling was aroused at the fact that, though this was the case, the ships should enjoy all the benefits and privileges of flying the British flag. The cardinal point to the profession was what bearing the combine might have upon future prospects. This could be but mere speculation, but it was some source of comfort to know that the combine had agreed with the British government to retain the ships under the red ensign for twenty years, which was at least some guarantee of future employment. At the same time, the institution of a new American nautical school at Rhode Island was not without significance. It did not require a very great stretch of imagination to apprehend that the pupils to be trained in that nautical school might be designed to officer the ships of the combine. Speaking in support of the adoption of the report, Lord Muskerry, who has been described as the "Plimsoll of the Peers," stated his intention of again introducing the aliens bill in the present parliamentary session, remarking that they might rely upon his persistent efforts to ensure that British ships shall be commanded and officered by our own countrymen. He also deprecated the granting of pilotage certificates to aliens, and this was a point he hoped to deal with in the bill. The carriage of deck cargoes in winter must be put a stop to, and he hoped to be able to convince parliament on that matter before long. He considered that the merchant service ought to receive more consideration at the hands of the government, as it was as much a national service as the navy.

SHIPPING CHANGES RECOMMENDED TO PARLIAMENT.

At a meeting a day or two ago of the parliamentary shipping committee Mr. C. McArthur's bill for the abolition of the light dues was approved and approval was also given to a bill to carry out the recommendations of the shipping subsidies committee for the revision of restrictive and out-of-date legislation. The proposals of the Belgian government to convene an international conference to bring about uniformity in the law of collision and salvage were approved of, and a resolution was passed urging the government to appoint delegates to such a conference. The committee also decided to ask the government for a separate parliamentary sitting to discuss the vote for the marine department of the board of trade. This last motion was passed before the discussion in the house of commons regarding the reconstitution of the board of trade as a ministry of commerce. An inquiry instituted by the government is now to take place into the whole position and functions of the board of trade, so

any special discussion as to the marine department of the board may now be deferred.

DOMINION LINE STEAMER COLUMBUS.

A few days ago the steel twin-screw steamer Columbus, latest addition to the Dominion Line, was launched by Harland & Wolff, Belfast, from their South Yard. This steamer is of somewhat similar design to the New England and Commonwealth, but of larger dimensions, having a gross tonnage of about 15,500 and being in many respects a facsimile of the latest and finest vessels built at Belfast for the Atlantic trade. The Columbus will carry a large number of first and second-class passengers, for whom the accommodation will be handsome and commodious. She will also have suitable accommodation for a large number of third-class passengers. The vessel will be fitted with the latest improvements, and in addition to having every facility for the rapid loading and discharging of a large general cargo, she will be fitted for the conveyance of dead meat. She will also be a suitable vessel for the transport service, if required. The machinery consists of two sets of quadruple-expansion engines on the balanced principle.

TWENTY-THREE KNOT NAVAL SHIPS.

In the matter of naval developments and experiments it is interesting to note that the first of the 23-knot ships of the French navy has never yet gone at her full speed, although protracted trials have been made. The cruiser Jeanne d'Arc was launched in 1899 and is of the armored type, with a displacement of 11,329 tons, which compares with the 9,800 tons of the British County class. The French ship has engines of 28,000 I. H. P. and the British vessels of 22,000 I. H. P., but the former has only realized 21.75 knots, which is 1¾ sea miles under the designed speed. Two of the British cruisers have been out on full power runs, and their speed has been 22½ to 22¾ knots. With new propellers there is every prospect of the full 23 knots being realized. At nine-tenths of her power the Jeanne d'Arc got slightly over 19 knots, but with very fine weather the British ships realized 21¾ knots with only 75 per cent. of the total power—more than the French ship did at full power. A French commission is now considering what further step should be taken with this ship, which has small-tube boilers.

MISCELLANEOUS MATTERS.

Belfast is to have a great graving dock that will cost £299,000. Relations of the Atlantic shipping combine to the firm of Harland & Wolff, ship builders, have hurried preparations for the new dock. On the completion of ship builders' leases, which are now being made, work on the dock will proceed. The new dock will be 750 ft. long, 96 ft. wide at the entrance and 100 ft. wide at the bottom. The depth will be 32 ft. from the blocks to ordinary high-water level, and some 4 ft. 6 in. will be allowed for the blocks. There will be a fitting-out jetty 600 ft. long.

The Hermes, second-class cruiser of 5,600 tons and 10,000 I. H. P., upon which repairs were recently completed at Harland & Wolff's, and which has Babcock & Wilcox boilers in place of Belleville boiler originally fitted, will shortly be handed over to the water-tube boiler committee, to be put through a long series of trials at progressive speeds, each of 60 hours' duration.

I hear from a German correspondent that a new association is to be formed at Hamburg for the increase of the shipping trade. On the committee are Herr Ballin of the Hamburg-American Line, Herr Woermann of the Woermann Line, Herr Wolff and others. The emperor has been enrolled as an ordinary member. The objects of the association are to create good sailors by getting young lads and training them on board a number of ships which it is intended to set aside for that purpose, to grant rewards for deeds of bravery, and to promote yachting.

SHIP BUILDING AT NEWPORT NEWS.

Newport News, Va., Mar. 18.—The Newport News Ship Building & Dry Dock Co. will submit bids for the construction of the new battleships just authorized by congress and will enter the competition for the contracts with other ship yards with a view of getting two if not three of the ships to build. The ship yard is now building the 16,000-ton battleship Louisiana, after which three of the five new battleships will be patterned. Great progress has been made on the Louisiana in February. In the first two weeks of this month the progress is even greater than in February and a marked gain over the navy yard job is looked for in the department report of April 1. Every effort will be made to finish this vessel within the contract time.

Saturday, April 18, is the date fixed for the launching of the armored cruiser West Virginia. Miss Katherine V. White, daughter of Governor White of West Virginia, has announced her acceptance of the honor of sponsor for the ship, conferred by the legislature of the state. The armored cruiser Maryland will go overboard a few weeks later, but the date has not been given out. The steamer Harry Luckenbach, which was converted at the yard from a cargo ship to a petroleum carrier, left here on Saturday for Sabine Pass, Tex., where she will load her first cargo of oil. She has been chartered to a large firm of oil shippers, it is understood. The Luckenbach also burns oil as fuel, special burners having been installed for the purpose. The Sarah V. Luckenbach, which was converted into an oil carrier some weeks ago, is now in service.

The naval board of inspection and survey, headed by Capt. C. J. Train, made the trip from Annapolis to Old Point on the new monitor Arkansas for the purpose of conducting the final acceptance trial of the ship. They found everything in good condition and the Arkansas to be a first-class vessel of her design. On the strength of the report of the board the navy department will formally accept the Arkansas, which was built here.

President Guilleadeu of the Old Dominion Steamship Co. was a visitor at the ship yard this week with a party of friends. He inspected the Old Dominion liner Monroe, which will be given her builder's trial on the 20th and will probably go into service the first week in April.

There is no danger of a strike of machinists at the yard. An authoritative statement is to the effect that the machinists may ask for more wages and a shorter work day but that they will not consider going out on strike and causing a repetition of the disastrous conditions that prevailed during the last strike here.

The protected cruiser San Francisco, Capt. Asa Walker, arrived in port Saturday from the navy yard, where she has been for some weeks undergoing repairs to her engine and boiler foundations. After coaling she will go to Old Point to await orders. The gunboat Marietta, which guarded American interests in Venezuelan waters during the recent trouble there, is expected in Hampton Roads in the next week or two. The torpedo boat destroyer Barry, on her official speed trial, developed a speed of 21 knots under natural conditions. The Topeka has gone to Boston. The Lancaster is at Yorktown. The Puritan is here with the San Francisco.

WORK AND WORRIES OF A SHIP YARD.

Mr. John Ward, one of the partners of Messrs. William Denny & Bros., Dumbarton, Scotland, recently delivered an interesting lecture to the Glasgow University Engineering Society on "The Work and Worries of a Ship Yard." Mr. Ward has had forty years' experience as a ship builder, twenty-six of which have been in charge of the Leven ship yard, Dumbarton. He has supervised the construction of 500 vessels, many of which are among the finest and fastest afloat. The first essential of a capable ship yard manager is a well-balanced mind, a mind free from dreaming and autocratic dogmatism, ready to drop prejudices, yet able to have a fair amount of scepticism for all new schemes which leave out of account the financial considerations involved in their adoption. To the general manager responsible for the work of the ship yard the two most important points were accurate cost estimating and the production thereafter of the finished ship at the basis estimate, while the outstanding dates which appealed to all the heads of departments were those of keel laid, completely framed, completely plated, launched, and tried and delivered, as these were the dates on which installments of the contract price were usually paid. In specialized work supervision was essentially necessary. Nothing went down quicker in the water than a light-draught steamer, and it was only by watching and weighing every item that the manager could hope to come right when the vessel was completed. Bad timekeeping was a very real trouble in a ship yard and the pity was that the profession should be so hampered and hindered by it. It was a humiliating fact that the ship building output on all the ship building rivers had to be measured not so much by the equipment of the yards engaged in it as by the time the unsteady men of the riveting department cared to work. He confessed to much sadness in knowing that ship building, through the high wages earned when working, should be the means of producing dissipated habits in many of its workmen who so wasted their time, means, health and opportunities as to make their high wage the reverse of a blessing.

ENORMOUS EXPENDITURE FOR BRITISH NAVY.

British navy estimates for 1903-4, as introduced in the house of commons a few days ago by the secretary of the admiralty, call for an expenditure of $179,184,205, a sum unparalleled in peace or war. The admiralty proposes to complete this year six battleships, eleven armored cruisers and one second-class cruiser, two sloops of war, four torpedo boat destroyers, eight torpedo boats and three submarine boats. Parliament is also asked to sanction the commencement of three battleships of a very formidable type, four first-class and three third-class cruisers, four very fast vessels to be used as scouts, fifteen torpedo boat destroyers and ten submarine boats. Twenty-one obsolete vessels have been withdrawn during the years 1902-3, the largest number on record. On the first of the coming month there will be under construction the enormous total of seventy-one ships, namely, eleven battleships, nineteen armored cruisers, two second-class cruisers, four third-class cruisers, four scouts, two sloops, eighteen torpedo boat destroyers, eight torpedo boats and three submarine boats.

The launching of the battleship Colorado, building at Cramps, has been postponed until April 25.

MR. GEORGE UHLER TO SUCCEED GEN. DUMONT.

Washington dispatches all say that with the appointment of Mr. George Uhler of Philadelphia, president of the Marine Engineers' Beneficial Association, as supervising inspector-general of the steamboat inspection service, will begin the complete re-organization of that service which has been in contemplation by Secretary Shaw of the treasury department and Secretary Cortelyou of the commerce department for some time past. The appointment of Mr. Uhler was made on the joint recommendation of the two cabinet officers named. The steamboat inspection service passes to the administration of Secretary Cortelyou on July 1, and before that time Mr. Uhler will be expected to have it placed as to personnel. Mr. Uhler will succeed James A. Dumont, who resigns after a service of over a quarter of a century, and who, although seventy-nine years old, is desirous of continuing his service in some less exacting position. The plan of placing him in the classified civil service and giving him employment in accordance with his wishes has been adopted, although no place has as yet been selected for him. During every administration for twenty years past an effort has been made to bring about the change that is now announced in his service. It was evident, all the time, that the work of the steamboat bureau was far from the standard of other brancnes of the treasury department, but as if by some hidden force the head of that bureau held his place.

Mr. George Uhler.

The chief office in the inspection service was first offered to Admiral Melville, who will shortly retire from the navy. The admiral, however, could not see his way clear to accept. It was then offered to Capt. J. W. Collins, chief of the revenue cutter service, but as he could not accept the position without forfeiting his retirement rights, he, too, declined. Mr. Uhler, who has accepted the appointment, has been for the last eleven years the national president of the Marine Engineers' Beneficial Association. Prior to that he had a long experience as chief engineer of steam vessels. As a leader of the marine engineers of the country, the men aboard ships, whose organization is a very large one, he has been highly successful. He is regarded by the appointing officers as the right man for the place as he possesses executive ability as well as a practical knowledge of marine engineering. Mr. Uhler has been in Washington during the past few days and has expressed himself as in favor of the suggested commission to revise the regulations relating to the construction and inspection of marine boilers. The rules of the service on this score are certainly antiquated. The appointment of a commission on revision was suggested by the American Boiler Manufacturers' Association. It was at first thought that an act of congress would be required for the appointment of this commission but it now seems that the authority is already vested in the secretary of the treasury, and if this is so revision of the regulations as far as boilers are concerned will probably be brought about in a hurry.

OPPOSED TO A MINISTER OF COMMERCE.

The movement in England to organize a department of commerce, similar to that over which Secretary Cortelyou presides in this country, is not hailed with great joy by the technical journals. Fairplay, in particular, grows quite sarcastic, saying:

"It is not perhaps a sign of redundant health in the body of British trade that there should be a cry for a ministry of commerce, and apparently for an extension of official control over business operations. May not the question pertinently be asked whether we do not owe our (still) prominent business position rather in part to the comparative immunity of British trade from the interference of official regulation than to the want of it; and does not the present cry possibly show a decrease of the bold individual self-reliance that has given us our trade, and indeed our empire itself? We do not say it does—we ask the question. It is something like asking which is the real soldier, the free man fighting in a natural way for his rights, or the strapped-up manikin, drilled to death, and with all his natural facilities artificially destroyed, to make a unit in a mass of similar ones, whose only possible use can be to combat a similar mass of other similar items? Who does not prefer the free man? There is already enough and to spare of systematic control of matters that by their nature cannot be properly reduced to system. Why should an artificial and superfluous and costly machine be constructed for the purpose of regulating, and indeed producing, the movements of a number of other independent machines, each working in a different manner and for different ends. In fact the English nature has been in the past, and it is to be hoped still is, able to help itself, in trade as in war, science and other respects. It is by the sum of individual efforts, by the special and independent action of individual minds, heads and arms, that a nation is made and kept great; not by the artificial hatching of official eggs in German fashion. The real trader, like the poet, is born, not made."

PROGRESS OF WORK AT FORE RIVER.

Quincy, Mass., Mar. 18.—The work of fitting out the United States cruiser Des Moines at the Fore River ship yard is already well along and the interior division of the officers' quarters is nearly finished. The partitions are of corrugated steel, and an asbestos sheathing is being put on the inside of the hull in the living quarters to make them damp-proof. The final painting of the interior of the vessel has begun.

The six-masted steel schooner William L. Douglas is rapidly taking shape. Most of the bottom frames are in place and the sides of the deep tanks amidships that will carry either cargo or ballast, as circumstances require, are well up. Four of the steel lower masts are practically completed. The schooner will probably be put overboard in July.

Enough material is already on hand so that the construction of the two Fall River Line steamers will begin very soon. One boat will be built on the stone foundations used for the cruiser Des Moines. Keel blocks for the other will be set flat on the building beach alongside the cruiser's former berth.

Structural work on the twin battleships New Jersey and Rhode Island is about one-third completed. The nickel-steel armor plates are being riveted to the protective deck and the stems and stern-posts are being connected with the frames. Both vessels will, it is expected, be launched early in the fall.

SHIP YARD NOTES.

Washburn Bros., Thomaston, Me., are to build two four-masters and one five-masted schooner.

Mr. George Gilchrist of Belfast, Me., is about ready to lay the keel for a four-masted schooner for M. Question & Bro.

Adams & Sons, East Boothbay, Me., have closed contract with Capt. Benjamin E. Pinkham for a four-masted wooden schooner.

Cobb, Butler & Co., Rockland, Me., have contracted with Crowell & Thurlow of Boston for a four-masted wooden schooner of the following dimensions: Length, 210 ft.; beam, 43 ft.; depth, 24 ft.

Dunn, Elliott & Co., Thomaston, Me., will shortly lay the keel for a three-masted wooden schooner of the following dimensions: Length, 140 ft.; beam, 43 ft.; depth, 10 ft. The firm will probably build a four-master later on.

The five-masted wooden schooner Gardner G. Deering was launched from the Deering yard, Bath, Me., this week. She is the eighteenth vessel to be built by Mr. Deering and the first to bear his name. Her dimensions are: Length, 251.6 ft.; breadth, 44 ft.; depth, 25 ft.

The four-masted schooner Cohasset, built by the Kelley-Spear Co., Bath, Me., for John S. Emery & Co., Boston, was launched last week. The Cohasset is a two-decked vessel, intended for the general coasting trade. Her dimensions are: Length of keel, 184.6 ft.; beam, 37.3 ft.; hold, 18.7 ft.

A monster hydraulic dredge, which when fully equipped with discharge pipes will cost more than $200,000, is to be built at the yard of the Tacoma Ship Building Co., Tacoma, Wash., for R. A. Perry of San Francisco, who has received the government contract for dredging the city waterway at Tacoma.

The American Power & Construction Co. has been organized to construct a large yacht building works at Gravesend bay, Ulmar park, New York. The ship building plant will consist of twelve large buildings and three marine railways. Dredges are at work upon the basin, which is to extend 1,600 ft. into the water with a breadth of 500 ft. It is understood that there is an abundance of capital behind the enterprise.

The Holmes Ship Building Co., Mystic, Conn., is building for Capt. C. A. Davis of Providence, R. I., a schooner of unusual type in that she will have no top masts. Her sticks will be somewhat longer than the lower masts of an ordinary schooner. The innovation does away with considerable rigging and it is claimed that it will be as practical to reef in a blow as to take in top sails. The schooner will be 160 ft. on the keel, 36 ft. beam and 13 ft. deep.

The Maryland Steel Co., Sparrow's Point, Md., has been awarded contract to build a large sea-going tug for the New York, Philadelphia & Norfolk Railroad, which will use the vessel in towing railroad car floats between Cape Charles and Norfolk. The tug is to be delivered in August. The vessel is to be all steel, including deck house, and is to be of the following dimensions: Length, over all, 122 ft.; width, 24 ft.; depth, 12 ft. 9 in. She will have a compound engine with cylinders of 20 and 40 in. diameter and stroke of 28 in.

A new chart of Alaska has just been issued by the Coast and Geodetic Survey. It sells at 50 cents and may be had from the Marine Review.

PRODUCTION OF STEEL AND STEEL RAILS.

[From Bulletin, American Iron & Steel Association.]

We present below complete statistics, received direct from the manufacturers, of the production of Bessemer steel in the United States in 1902; also of Bessemer steel rails by the producers of Bessemer steel ingots. Neither the production of Bessemer ingots nor the production of Bessemer rails kept pace in 1902 with the marvelous growth in that year of our iron and steel industries taken as a whole, which was owing entirely to the fact that the Lackawanna Iron & Steel Co. dismantled its Bessemer plants and its rail mills, as well as its remaining blast furnace, at Scranton, early in the year, preparatory to the erection at Buffalo by the Lackawanna Steel Co. of new and more extensive works, which are not yet entirely completed. The north works of the company at Scranton made their last rails on Jan. 16, 1902, and the south works made their last rails on Feb. 26.

Ingots and Castings.—The total production of Bessemer steel ingots and castings in 1902 was 9,306,471 gross tons, against 8,713,302 tons in 1901, an increase of 593,169 tons, or 6.8 per cent. The increase in 1901 over 1900 amounted to 2,028,532 tons, or over 30 per cent. The production of 1902 was the largest in our history. The following table gives the production of Bessemer steel ingots and castings in the last six years. Of the production last year 10,466 tons were steel castings, against a production of 6,764 tons in 1901.

Years. Gross tons.	Bessemer ingots.	Years. Gross tons.	Bessemer ingots.
1897	5,475,315	1900	6,684,770
1898	6,609,017	1901	8,713,302
1899	7,586,354	1902	9,306,471

Below we give by states the production of Bessemer ingots and castings in the last four years.

States—Ingots.	1899. Gross tons.	1900. Gross tons.	1901. Gross tons.	1902. Gross tons.
Pennsylvania	3,968,779	3,488,731	4,293,439	4,379,516
Ohio	1,679,237	1,388,124	2,154,846	2,528,802
Illinois	1,211,246	1,115,571	1,324,217	1,443,614
Other states	727,092	692,344	940,800	954,539
Total	7,586,354	6,684,770	8,713,302	9,306,471

There were no Clapp-Griffiths works in operation in 1902 and only two Robert-Bessemer plants were active. Five Tropenas plants were at work, as compared with seven in 1901. In addition one Bookwalter converter was running. All these works that were active were engaged in the production of steel castings only.

Rails.—The production of all kinds of Bessemer steel rails by the producers of Bessemer steel ingots in 1902 was 2,876,293 gross tons, against a similar production in 1901 of 2,836,273 tons, in 1900 of 2,361,921 tons, and in 1899 of 2,240,767 tons. The maximum production of Bessemer steel rails by the producers of Bessemer steel ingots was reached in 1902, but the increase in that year over 1901 amounted to only 40,020 tons, or 1.4 per cent. As compared with 1887, fifteen years ago, the increase in 1902 in the production of Bessemer rails amounted to only 831,474 tons, or 40 per cent., while during the same period the increase in the production of Bessemer ingots amounted to 6,370,438 tons, or almost 217 per cent. The following table shows the production by states of Bessemer steel rails by the producers of Bessemer steel ingots in the last four years. The figures do not include a small quantity of rails made each year from purchased blooms or from rerolled steel rails, statistics for both of which products for 1902 are not yet available.

States—Rails.	1899. Gross tons.	1900. Gross tons.	1901. Gross tons.	1902. Gross tons.
Pennsylvania	1,224,807	1,195,255	1,406,008	1,148,425
Other states	1,015,960	1,166,666	1,430,265	1,727,868
Total	2,240,767	2,361,921	2,836,273	2,876,293

At the request of the manufacturers we separated for 1897, for the first time, the production of rails weighing 45 lbs. and less than 85 lbs. to the yard from those weighing less than 45 lbs. and over 85 lbs. to the yard. This separation we continue for 1902 as follows. Bessemer rails made from purchased ingots or from rerolled rails are not included.

States—Rails.	Under 45 pounds. Gross tons	45 pounds and less than 85. Gross tons.	85 pounds and over. Gross tons.	Total. Gross tons.
Pennsylvania	53,964	766,567	327,894	1,148,425
Other states	173,104	1,237,496	317,268	1,727,868
Total for 1902	227,068	2,004,063	645,162	2,876,293
Total for 1901	140,214	2,202,237	493,822	2,836,273
Total for 1900	154,796	1,605,067	602,058	2,361,921

It will be noticed that there was a considerable decline in 1901 in the production of Bessemer steel rails weighing 85 lbs. and over as compared with 1900, but that in 1902 there was an increase over 1900 and a very large increase over 1901. The production of rails weighing between 45 and 85 lbs. shows a slight decrease in 1902 as compared with 1901.

The total production of rails in 1902 will include rails made from open-hearth steel, rails rolled from purchased Bessemer blooms, rerolled rails, and iron rails. The total from all these sources in 1901 amounted to 38,366 tons.

With the exception of the Lackawanna plant at Scranton all our Bessemer rail mills were operated nearly to their full capacity in 1902, the demand for steel rails being greater than the supply all through the year. In addition to our large production of rails we imported last year 63,522 tons of iron and steel rails, but to balance this importation we exported 67,666 tons of iron and steel rails. In 1901 we exported 318,956 tons of rails and imported only 1,905 tons. Virtually all our imports and exports of rails are steel rails.

CANADIAN SHIPPING NOTES.

The Dominion government has called for tenders for an Atlantic steamship service from Liverpool, calling at an Irish port, to Montreal in summer and to Halifax in winter, a price to be given for a service weekly at 16, 18 and 21 knots respectively. The firm of H. & A. Allan are willing to tender for an 18-knot service. It is not known what the Canadian Pacific will do, but that company will tender and it is expected that some of the other lines, particularly the Furness Line, will tender.

The question of establishing a works for the construction of steel ships in Nova Scotia is again being discussed and committees representing Halifax and Dartmouth are going over the claims of these practically adjoining ports with a view of coming to an agreement as to a suitable location. Each town is prepared to give a subsidy of $100,000 and the legislature will give a similar amount.

Mr. Connolly of Montreal, who has a contract with the Dominion government to maintain steamship communication between St. Lawrence ports and the Bay des Chaleur, Que., has purchased a new steamer in Great Britain and is in treaty for a second. Both are expected to reach Montreal soon after the opening of navigation.

The Dominion Atlantic Ry. Co. has paid over the balance of the purchase money of the steamers Yarmouth and Boston to the Yarmouth Steamship Co. The liquidation of the latter company's affairs will now be completed and it is expected that the shareholders will receive about 40 cents on the dollar.

Commissioners appointed to look into the question of providing a dry dock for Montreal have been looking over several sites in the eastern part of the city. It is expected that they will consider the advisability of recommending a floating dock before making a definite report.

Capt. W. O. Zealand of Hamilton has been appointed to command of the Dominion steamer Lord Stanley, which is to be engaged during the coming season of navigation on the hydrographic survey of the Thunder bay section of Lake Superior.

The Merchants Line of Montreal, now running the steamers Persia and Ocean, has arranged to operate three additional freight steamers between the St. Lawrence and the head of Lake Superior. Two steamers have been acquired in Canada and one in England.

A new tug, the Victor, is ready for launching at Butler's yard, Yarmouth, N. S., for N. & M. Smith & Co., of Halifax. Her dimensions are: Length, 62 ft.; breadth, 12 ft.; depth, 7 ft. The engines were constructed by the New Burrell-Johnson Iron Co.

The Grey & Bruce Cement Co. has let a contract for the construction of a wharf 600 ft. long with an L 228 ft. long at Owen Sound, Ont., the depth of water alongside to be 16 ft. J. Wilson of Burlington, Ont., has the contract.

The Goderich Engine Co. has on hand new compound engines for the tug Laura Grace, new engines for the tug A. Wright and an engine and boiler for a tug under construction at Midland, Ont.

Capt. J. Foote, formerly connected with the Algonac Central Ry. Co.'s steamship service at Sault Ste. Marie, has been appointed superintendent of the turret steamers of the Canadian Lake & Ocean Navigation Co., succeeding Capt. T. Donnelly.

The Dominion Coal Co. is asking the Dominion government to expend $35,000 in dredging the harbor and approaches at Glace Bay, N. S., so that it may erect wharves there for shipping coal.

Capt. Graves, at one time master of the Richelieu & Ontario Navigation Co.'s steamer Hamilton, and lately in charge of the Van Allen, died, after an operation in Toronto, a few days ago.

Thomas Drein & Son, Wilmington, Del., builders of life boats, life rafts, etc., report the following among new orders: For a steamer building at Bath, set of metallic life boats; for United States navy yard, Boston, 18-ft. and 14-ft. metallic life boats; for a British steamer in New York, large wooden life boats with air tanks; for steamship in Norfolk, six 24-ft. patent beaded galvanized steel life boats and four sea life rafts; for steamship at Portland, six 22-ft. and four 24-ft. patent metallic boats and six life rafts; for Philadelphia & Baltimore Steamship Co., six 22-ft. patent metallic boats and life rafts; for steamship in Alabama, two 14-ft., one 16-ft. and one 20-ft. patent galvanized metallic boats; for New York & Sandy Hook Steamboat Co., six 22-ft. metallic boats and life rafts; for a new steamer of Standard Oil Co.'s fleet, set of metallic boats.

BEST SHIPS OF THE ORE TRADE.

A Summary Showing the Character of Vessels Engaged in Moving Iron Ore from Two Harbors, one of the Principal Shipping Ports of Lake Superior—Average Cargo of 281 Vessels is 4,830 Gross Tons.

In the season of 1902 there was moved from Two Harbors, one of the principal ore shipping ports on Lake Superior, 5,549,120 gross tons of ore. This large quantity of ore was carried down the lakes by 281 vessels. The number of cargoes was 1,149, so that the average cargo was 4,830 gross tons. This average shows how the ore trade is constantly drifting to big vessels. The great bulk of this ore was moved a distance of about 875 miles by water, as 4,665,342 tons of it was consigned to Lake Erie ports, against 883,778 tons to Chicago. The maximum cargo, 7,576 tons, was taken out by the steel tow barge John Smeaton, Aug. 14, and the minimum cargo, 1,070 tons, by the wooden steamer Rube Richards, Oct 4. The average time loading for all the vessels was 8 hours. The first clearance was the steamer F. B. Wells, April 2, and the last clearance the steamer Lansing, Dec. 7. Following is a list of the vessels that engaged in this trade, together with the amount of ore moved by each of the vessels and the average cargo of each vessel:

STEAM VESSELS.

Name	Cargoes	Total Tons	Aver. Cargo
Admiral	12	75,387	6,282
Albright, J. J.	3	18,046	6,015
Alva	3	11,242	3,747
Amazonas	1	3,217	3,217
America	1	3,030	3,030
Appomattox	3	9,630	3,210
Armour, P. D.	1	2,532	2,532
Aurania	2	10,031	5,015
Bangor, City of	4	18,092	4,523
Bannockburn	1	2,235	2,235
Bartlett, E. B.	1	2,490	2,490
Berlin, City of	3	8,956	2,985
Bermuda	1	2,065	2,065
Bessemer, Henry	6	32,754	5,459
Bielman, C. F.	1	3,127	3,127
Black, C. A.	5	30,109	6,021
Bransford	1	5,642	5,642
Briton	1	3,124	3,124
Brower, A. G.	9	42,434	4,714
Brown, W. W.	7	32,596	4,656
Brown, W. L.	5	31,122	6,224
Brown, H. H.	1	4,182	4,182
Bunsen, R. W. E.	3	19,896	6,632
Carnegie, Andrew.	11	62,374	5,670
Cartagena	1	2,620	2,620
Case	4	11,581	2,895
Cherokee	4	6,685	1,671
Chill	1	3,803	3,803
Chisholm, Wm.	1	2,425	2,425
Christopher	1	5,540	5,540
Corgate, Jas. B.	3	10,278	3,426
Colonel	5	25,584	5,116
Columbia	1	2,123	2,123
Coralia	5	26,659	5,331
Corona	2	6,217	3,108
Cornell	6	38,998	6,499
Corsica	2	5,809	2,904
Cort, Henry	1	2,998	2,998
Craig, John	1	2,563	2,563
Cranage, Thomas	3	9,301	3,100
Crescent City	3	17,216	5,705
Cumberland	2	4,875	2,437
Curry, S. S.	4	18,590	4,647
Devereux, J. H.	1	2,474	2,474
Eads, James B.	7	33,013	4,716
Eddy, Charles A.	3	8,579	2,859
Edenborn, Wm.	5	35,373	7,074
Ellwood, I. L.	12	86,789	7,232
Elphicke, M. C.	9	56,800	6,311
Empire City	6	34,032	5,672
Ericsson, John	3	16,073	5,357
Etruria	11	68,121	6,192
Fairbairn, Wm.	6	31,729	5,288
Fay, J. S.	1	1,490	1,490
Fitch, Wm. F.	10	45,855	4,585
Flower, R. P.	1	2,257	2,257
Frick, H. C.	5	30,199	6,039
Fryer, R. L.	6	17,175	2,862
Fulton, Robert.	3	16,233	5,411
Gates, J. W.	6	42,189	7,031
Gayley, Jas.	9	55,984	6,220
Genoa, City of	2	6,063	3,031
German	2	6,269	3,134
Gilchrist	2	10,705	5,352
Goodyear, F. H.	2	12,684	6,342
Gratwick, W. H.	7	26,622	3,803
Gratwick, W. H.	3	17,338	5,779
Grecian	1	3,255	3,255
Griffin	1	2,594	2,594
Grover, M. B.	1	2,628	2,628
Harlem	1	2,774	2,774
Hart, F. W.	1	5,496	5,496
Harvard	8	52,991	6,623
Heffelfinger.	4	24,714	6,178
Helena	2	5,696	2,848
Hesper	1	2,503	2,503
Hill, James J.	6	41,653	6,942
Holden, H. S.	9	53,721	5,969
Houghton, Doug.	2	11,484	5,742
Hoyt, Colgate	4	10,104	2,526
Hutchinson, J. T.	1	4,609	4,609
India	3	3,886	1,295
Iosco	1	3,000	3,000
Jupiter	4	18,784	4,696
La Fayette	9	53,021	6,588
Lagonda	3	13,647	4,549
Lake Shore	1	5,115	5,115
Langham	3	8,562	2,854
Lansing	1	2,165	2,165
Lewiston	1	2,780	2,780
Linn, W. R.	6	33,210	5,535
Livingstone	3	9,024	3,008
Lockwood, C. B.	1	3,298	3,298
Luzon	1	4,647	4,647
Mack, W. S.	2	9,200	4,600
Majestic	2	5,588	2,794
Major	3	8,553	2,851
Malietoa	3	20,270	6,756
Manhattan	1	2,184	2,184
Manola	4	12,014	3,003
Maricopa	3	16,392	5,464
Marina	3	9,113	3,037
Mariposa	3	12,223	4,074
Mariska	1	3,110	3,110
Maritanna	4	15,186	3,796
Mars	1	4,704	4,704
Maruba	1	3,243	3,243
Maryland	3	10,897	3,632
Masaba	2	5,989	2,994
Mataafa	1	6,313	6,313
Mather, Samuel	3	9,823	3,274
Matoa	1	3,040	3,040
Mauch Chunk	2	10,067	5,033
Maunaloa	8	47,070	5,883
McDougall, Alex.	8	50,208	6,276
McWilliams, J. J.	6	26,619	4,436
Mecosta	1	2,711	2,711
Moore, J. W.	2	6,029	3,014
Morse, S. F. B.	7	44,696	6,385
Murphy, Simon J.	4	27,315	6,829
Naples, City of	1	2,943	2,943
Neilson, J. B.	2	6,719	3,359
Neosho	2	5,119	2,559
Neptune	4	18,768	4,692
Neshoto	1	2,987	2,987
Nicholas, I. W.	3	11,577	3,859
Nimick, Alex.	2	5,694	2,847
Nottingham, Wm.	9	51,114	5,679
Nyanza	2	5,902	2,951
Oliver, H. W.	11	72,820	6,620
Orinoco	2	6,794	3,397
Osborne, F. M.	2	11,397	5,698
Owen, John	7	21,201	3,028
Palmer, Wm. P.	2	5,200	2,600
Palmer, T. W.	1	2,921	2,921
Panther	3	6,836	2,278
Paris, City of	3	8,244	2,748
Parker, A. A.	1	2,382	2,382
Pasadena	1	2,452	2,452
Pathfinder	9	32,686	3,631
Peavey, F. H.	3	18,736	6,245
Peavey, Geo. W.	9	57,373	6,374
Penobscot	2	8,698	4,349
Pentland	5	5,862	1,172
Poe, Gen'l. O. M.	5	35,138	7,027
Pope, E. C.	6	23,468	3,911
Presley, George	8	19,164	2,395
Princeton	6	38,540	6,423
Queen City	3	16,795	5,598
Ramapo	1	3,871	3,871
Ranney, R. P.	2	4,356	2,178
Rappahannock	1	3,262	3,262
Rees, W. D.	5	25,739	5,147
Reis, W. E.	4	25,155	6,288
Rend, W. P.	1	2,828	2,828
Rensselaer	5	33,743	6,748
Rhodes, R. R.	6	13,184	2,197
Richards, Rube	1	1,076	1,076
Rockefeller, F.	3	13,946	4,648
Rome, City of	2	5,536	2,768
Roumania	1	2,412	2,412
Sacramento	1	3,263	3,263
Samoa	1	1,452	1,452
Saturn	2	9,190	4,595
Saunders, E. N.	5	28,788	5,757
Scranton	2	5,301	2,650
Scranton, Walter	2	12,732	6,366
Senator	4	20,624	5,156
Sevona	2	6,303	3,151
Shenandoah	2	6,451	3,225
Siberia	1	2,102	2,102
Siemens, Sir Wm.	5	27,309	5,461
Sitka	2	5,232	2,616
Smith, L. C.	5	30,509	6,101
Sonora	2	9,779	4,889
Starrucca	4	16,767	4,191
Steel King	3	16,608	5,536
Steinbrenner, H.	1	6,134	6,134
Stephenson, Geo.	3	16,675	5,558
Stewart, A. E.	3	15,390	5,130
Stone, Geo.	1	2,661	2,661
Strathcona	1	3,123	3,123
Sultana	3	14,246	4,748
Superior City	4	26,355	6,588
Tampa	1	2,867	2,867
Taylor, Moses	2	12,360	6,180
Tower, Jr., C.	1	2,510	2,510
Trevor, J. B.	1	3,118	3,118
Uranus	3	13,899	4,633
Van Hise, C. R.	6	39,345	6,557
Vega	2	6,544	3,272
Venus	1	4,461	4,461
Victory	10	51,136	5,113
Volunteer	3	7,901	2,633
Wade, J. H.	1	2,738	2,738
Watson, C. W.	1	5,342	5,342
Watt, James	4	22,034	5,508
Wawatam	1	2,671	2,671
Wells, F. B.	9	56,675	6,297
Whitney, D. M.	5	30,836	6,167
Wilkes-Barre	2	10,551	5,275
Wilkinson, H. S.	11	55,912	5,082
Wilson, Capt. T.	5	31,166	6,233
Wolvin, A. B.	1	2,757	2,757
Wright, A. P.	1	2,940	2,940
Yale	2	9,837	4,918
Yosemite	10	52,444	5,244
Yuma	1	4,027	4,027
Zenith City	3	15,081	5,027

SAIL VESSELS.

Name	Cargoes	Total Tons	Aver. Cargo
Amazon	2	11,573	5,786
Antrim	7	37,302	5,328
Aurora	5	15,542	3,108
Bell, Sir I. L.	7	36,862	5,266
Bryn Mawr	12	78,278	6,523
Carrington	9	45,699	5,077
Chicamauga	1	3,999	3,999
Chippewa	2	4,089	2,044
Cobb, Ahira	1	1,456	1,456
Constitution	8	42,625	5,328
Corliss, Geo. H.	11	56,695	5,154
Crete	1	3,357	3,357
Fritz, John	17	119,932	7,054
Granada	1	2,778	2,778
Hamilton	1	1,800	1,800
Hartnell, G. E.	1	5,168	5,168
Holley, Alex.	10	53,098	5,309
Hutchinson, E. C.	1	1,388	1,388
Iron Queen	2	4,921	2,460
Jeanette, Olive	3	7,331	2,443
Jenny, W. LeB.	12	63,053	5,254
Krupp, Alfred.	10	51,432	5,143
Madeira	16	111,996	6,999
Magna	10	52,624	5,262
Maia	13	77,908	5,992
Maida	10	56,271	5,627
Maitland, Alex.	5	26,328	5,265
Malta	3	11,953	3,984
Manda	6	30,872	5,145
Manila	12	84,228	7,019
Marcia	7	27,849	3,978
Marsala	16	112,198	7,012
Martha	7	36,046	5,149
Matanzas	3	12,599	4,199
Melrose	1	1,391	1,391
Minnedosa	1	1,559	1,559
Nasmyth, James	7	36,905	5,272
Norton, D. Z.	15	79,041	5,269
Polynesia	1	5,495	5,495
Pretoria	2	9,136	4,568
Quayle, Thos.	1	1,282	1,282
Redington, Nellie	6	9,244	1,540
Roebling, Jno. A.	14	96,464	6,890
Russell, Jno. S.	6	16,734	2,788
Sandusky	1	1,109	1,109
Santiago	2	8,473	4,236
Smeaton, John.	15	107,889	7,192
Thomas, S. G.	8	41,786	5,223
Thompson, A. W.	4	16,402	4,100
Tyrone	3	11,766	3,922
Warriner, S. D.	2	8,091	4,045
Whaleback No. 105	11	33,333	3,030
Whaleback No. 107	10	30,505	3,050
Whaleback No. 109	5	13,707	2,741
Whaleback No. 110	3	8,311	2,770
Whaleback No. 111	5	13,895	2,779
Whaleback No. 116	5	13,683	2,736
Whaleback No. 117	10	31,604	3,160
Whaleback No. 118	5	15,981	3,196
Whaleback No. 126	6	16,437	2,739
Whaleback No. 127	6	16,210	2,701
Whaleback No. 129	2	6,296	3,148
Whaleback No. 130	7	21,845	3,120
Whaleback No. 131	7	21,956	3,136
Whaleback No. 132	4	12,243	3,060
Whaleback No. 133	5	15,636	3,127
Whaleback No. 134	7	21,745	3,106
Whaleback No. 137	9	44,246	4,916
Whaleback No. 201	3	6,715	2,238
Whaleback No. 202	3	6,615	2,205
Whitworth, Sir J.	4	10,692	2,673
Yukon	2	6,522	3,261

Note—All tons are gross tons, 2,240 lbs.

LAKE FREIGHT MATTERS.

As managers of the ore and coal docks on Lake Erie are only now treating with the longshoremen on the question of wages for the coming season, and as the Lake Carriers have not yet fully completed their arrangements with the labor organizations, there is little disposition among the vessel men to hurry the matter of ore and coal freight contracts, especially as they fear they will not get advance enough over last year's rates to meet the increased operating expenses involved in a charge of $2.90 a ton for fuel, in the new contracts with labor, and possibly in a higher charge for unloading ore. On the other hand the ore shippers know that they must face large stocks of ore on Lake Erie docks on the opening of navigation. They know also that with dock space even more limited than it was a year ago, and with little hope of much improvement in railway facilities for direct shipments to furnaces, their arrangements for a large increase over last year's output of ore may fall short of expectations. They see also the indications of a very early opening of navigation, which is to their advantage, and they are not therefore disposed to take up the question of lake freights until they find it necessary to do so. Of course the best hopes of the vessel men rest with the certainty of an enormous coal movement and more than the average movement

of grain. The report from Buffalo that a rate of 40 cents to Lake Superior and 50 cents to Lake Michigan has been fixed on first cargoes of hard coal is not encouraging to the vessel men, as 45 cents was expected on Lake Superior business.

It has been agreed that in the ore trade during the coming season the lake freight to be paid from Marquette will be only 5 cents less than the freight rate from the head of Lake Superior, and that the rate from Escanaba will be only 15 cents less than the rate from the head of the lakes. This is a cutting down of differentials. In the past the Marquette rate has been 10 cents less than the head-of-the-lake rate, and the Escanaba rate 20 cents less.

EARLY OPENING OF LAKE NAVIGATION.

Weather conditions in the upper-lake region are such that it is expected the ice will be sufficiently broken up to permit of the passage of vessels not only through the Straits of Mackinaw but also through the Sault river about April 1. Of course there is a possibility of cold weather changing the opinions now prevailing on this score, but everything points to a very early opening. This is not welcome news to the vessel owners, who prefer a short season from the standpoint of freights, and many of them will not have their vessels ready on the opening, as they are not at all anxious to hurry matters. With the Steel Corporation and its big fleet of ore carriers the situation is different, however, as their aim will be to employ the ships to the fullest capacity and they will probably be ready to start as soon as the channels are clear. It is understood that the railways between the mines and shipping ports will try to have the docks filled with ore by the time vessels begin to move, but if the rivers and the straits are open as early as April 1 more difficulty will probably be found in getting the ore from the mines than the vessels will encounter in reaching the shipping ports. Passenger vessels on short runs across Lake Erie and up and down Lake Michigan are already in commission, but the real opening of navigation on the lakes follows the first passage of ships through the Straits of Mackinaw. Following are the dates on which the straits opened during sixteen years past:

1887	April 17	1895	April 11
1888	May 4	1896	April 16
1889	Mar. 25	1897	April 9
1890	April 8	1898	April 2
1891	April 15	1899	April 26
1892	April 3	1900	April 18
1893	April 17	1901	April 14
1894	April 2	1902	April 2

COAL MOVEMENT ON THE LAKES.

Through some kind of a summary of reports from collectors of customs, the treasury department bureau of statistics figures that the total movement of coal, hard and soft, throughout the lakes in 1902 was 15,504,540 tons (2,000 lbs.) and in 1901, 15,868,023 tons. These figures are given simply for what they are worth, as it has several times been explained in these columns that the customs house figures are not all the time reliable, and the refusal of the railways to give out reports of the coal movement does not admit of the kind of complete statistics as to that trade that have been compiled for years past regarding iron ore. These coal figures from the Washington bureau seem too high. The report in which they are contained says:

"Returns from 168 fueling and steamship companies show a total of 2,639,252 net tons of coal put on board lake vessels for their own steaming purposes during 1902, all except 488 tons of which were soft coal. The quantity (fuel) reported for the year 1901 was 1,765,864 net tons. Coal shipments combined with fuel consumption by vessels amounted to 12,855,971 tons in 1902, in comparison with 11,052,418 tons in 1901. If to these totals be added the quantity exported through lake ports (which was 4,648,569 tons in 1902 and 4,815,605 tons in 1901), the grand total of the coal trade on the lakes would be 15,504,540 tons for 1902 and 15,868,023 tons for 1901."

GOVERNMENT DREDGE TO BE BUILT.

Advices from Washington are to the effect that the war department will build a suction dredge for service on Lake Erie. The construction of this dredge was authorized last year, since which time the matter has been pretty thoroughly threshed out between private interests and the government. It was thought the construction of the dredge might be discretionary on the part of the secretary of war but the attorney-general is reported as holding that the act is mandatory. Gen. Gillespie, chief of engineers, has prepared a report urging the construction of the dredge and Secretary Root has given it his approval. In his report Gen. Gillespie says:

"A very important class of dredging on Lake Erie is of an emergency character, and for the purpose of restoring channels from the lake into the various important harbors. This work has to be provided for now by the use of private dredges which are not adapted to such work, making its cost unnecessarily expensive and resulting in delays most injurious to the interests of navigation. The proposed government dredge is to be a powerful sea-going boat, which will perform the class of work referred to at a greatly reduced cost to the United States, and in a fraction of the time now required. A protest against the construction of such a dredge is in effect a protest against the granting of such relief to the navigation interests of the lakes as they pray for and are entitled to. Numerous examples can be presented showing the excessive cost and delay arising from a dependence upon private dredges on Lake Erie and illustrating most emphatically the necessity for the construction of the dredge as proposed."

The emergency work to which Gen. Gillespie refers is the removal of bars at the mouths of the rivers, which form during the winter time and which are an impediment to deep-draught vessels which seek to enter the harbors at the opening of navigation. The engineer branch of the government claims that these bars can be much more cheaply removed by a government dredge built for the purpose than by letting the work to dredging contractors. This is denied by the contractors, and they say also that with ordinary precautions on the part of the engineer in charge—making arrangements early enough each year for the dredging—no part of the complaint about sand bars at harbor entrances could be charged to the concerns doing the work. Gen. Gillespie's report conveys the idea that the vessel interests are clamoring for a government dredge. Such is not the case. If the suggestion to the engineers to build the dredge was from Senator Hanna, the demand upon him undoubtedly came from some source other than the vessel owners, who are not encouraging the government to enter into competition with the private enterprise of its citizens. Neither has the engineer of the Cleveland district been urged by any of the vessel owners to go to the extreme of building a government dredge in order to care for the harbor entrances. Of course the railroads, who would have all their private dredging put into a river and harbor bill if they could do so, will encourage a step of this kind. Notwithstanding the fact that Gen. Gillespie says the government dredge can do the work for which it is to be built at a greatly reduced cost to the United States, it will very probably be found when operating and non-operating expenses are calculated, with interest on the investment and high charges in government methods, that the people are paying a stiff figure for the work.

LAKE SHIP YARD MATTERS.

It was related some time ago that the Detroit River & Lake Erie Railway Co. had plans under way for the construction of a combination car ferry for service on Lake Erie between Conneaut and Port Stanley or Port Dover, and also a twin-screw car ferry for service between Sarnia and Port Huron. These plans were being designed by Mr. Frank E. Kirby of the Detroit Ship Building Co. when the Pere Marquette system took over the Detroit River & Lake Erie Railway Co. The Pere Marquette company has now decided to build these two car ferries and has entered into contract with the American Ship Building Co. for their construction. One will be built at Detroit and the other at Buffalo. The Lake Erie ferry will be fitted with tracks but is not designed to carry cars across the lake. The coal cars will be run aboard the ferry and the coal dumped into the hold. The tracks will be so arranged as to fold up, making a sort of continuous hatch for the operation of clam-shell hoists at the Canadian port. The Port Huron-Sarnia ferry will be the customary type of car ferry but will have twin-screws at either end. These new ferries are not to come out until 1904. In addition the Pere Marquette railway is having built at the Cleveland yard of the American Ship Building Co. the two big car ferry steamers for its Lake Michigan service.

A special from Sault Ste. Marie is to the effect that Hickler Bros. are to build a marine railway and ship yard at that point. The yard will be of sufficient size to handle all kinds of lake craft up to 1,000 tons burden and is designed principally to care for repairs upon this class of craft. Hickler Bros. have secured the necessary site and are now petitioning the council of Sault Ste. Marie to vacate the foot of a street which separates two pieces of property held by them. The marine railway is to be of the type built by the H. I. Crandall & Sons Co. of East Boston, Mass., who are well known in this kind of work and who have built some of the best marine railways in the country. It will be 180 ft. long and 50 ft. wide, with 7 ft. water for yard and 14 ft. aft. An illustration of one of the Crandall marine railways will be found in the advertisement of the company elsewhere in this issue. They are now tendering on a large steel marine railway to be situated at Perosus, Harbor of Athens, Greece.

The steamer George L. Craig was launched from the yard of the Craig Ship Building Co., Toledo, a few days ago. She is for the Monroe Transportation Co. and is 360 ft. in length, 50 ft. beam and 28 ft. deep. The launch was very successful and was attended by thousands of persons.

Miller Steamship Co. is the name of the corporation that will own and operate the 5,000-ton freight steamer building at the Buffalo works of the American Ship Building Co. for J. E. Ball, J. J. McWilliams and others, and which is to be named P. P. Miller. Directors of the company are J. J. McWilliams, P. P. Miller, O. G. Donaldson, J. E. Ball and Edward Smith.

DEEP WATERWAY TO THE HUDSON.

The Engineering News has for some time past been an earnest advocate of a ship-canal connection between the lakes and the Hudson river in preference to the proposed conversion of the Erie canal into a 1,000-ton barge canal. In its current issue it discusses the subject in the following wise:

In the discussion in the New York legislature over the 1,000-ton barge canal project, references all the time appear to the proposed United States deep waterway from the lakes to the ocean. There is, in fact, a considerable party in the legislature, which opposes the barge-canal proposition and favors instead the construction by the United States of a ship-canal connection from the lakes to the Hudson. Unfortunately, the public and the members of the legislature appear to have little knowledge concerning this ship-canal project. It seems to be unknown to many that the entire route has been carefully surveyed and estimated and has been the subject of as complete and thorough an engineering investigation as has ever been made, perhaps, for any public work in this country. The results of this investigation, however, have never been spread before the public. They were put on record, indeed, in the three huge volumes of the official report; but they have been barely mentioned in the newspapers and have received little more attention in technical journals. For this reason we have deemed it appropriate at this time to present a brief description of this proposed ship-canal, believing that knowledge concerning it is essential to a fair judgment of the rival 1,000-ton barge canal project now under consideration in New York.

Agitation for a ship-canal or deep waterway from the lakes to the ocean has been going on since the '70's, and in the early '90's the interest in it became such that conventions were held in the lake cities to further the project. This led to the appointment by President Cleveland in 1895, of an international commission to investigate the project and report upon it. The United States members of this commission were President Jos. B. Angell of Michigan university; Lyman E. Cooley, C. E., of Chicago, and Hon. John E. Russell of Massachusetts. This commission had only sufficient funds to make a few rough reconnoissance surveys, but in its report it affirmed the feasibility of the ship-canal project and advised that detailed surveys be made.

In 1897 congress made provision for such surveys and President McKinley appointed Maj. Chas. W. Raymond, corps of engineers, U. S. A., and Messrs. Alfred Noble and Geo. Y. Wisner, members of the American Society of Civil Engineers, as a commission to conduct such surveys. Three years' time and $485,000 of money were spent in this work, and the commission's report, presented in 1900, gives complete information upon the project in every detail.

Previous to this commission's investigation all sorts of opinions were held concerning the ship-canal—or deep waterway—scheme, and the data were lacking on which to base any intelligent opinion. None could say certainly whether such a canal were practicable as an engineering proposition or not; whether, if built, ships would use it; whether it should be made deep enough to float the largest class of ocean-going vessels, or only deep enough for the vessels of the great lakes, or whether a canal for large barges—such as New York has now under discussion—would not answer every purpose. The matter of route was also a matter of speculation. Some favored the route via the St. Lawrence river and Lake Champlain, some, that by Lake Ontario and the Oswego and Mohawk rivers; some the route of the present Erie canal. All these matters and many others which have been in controversy were given the fullest expert investigation by the commission and its conclusions are entitled to the weight of authority. No man today is competent to discuss intelligently the subject of water routes from the lakes to the Atlantic unless he has studied the Deep Waterway Commission's report; and whoever takes a position opposite to the conclusions expressed in this report deserves no credence unless he presents his grounds for dissent from these conclusions.

First and most important is the matter of depth. The commission made complete surveys and estimates for two channels, the one a waterway of 21 ft. depth, which would give passage to all the vessels now navigating the great lakes and to the great bulk of the merchant marine on the ocean as well, the other a channel 30 ft. in depth, large enough for practically all the vessels afloat on the ocean which are operated under traffic conditions that would permit them to use such a canal. The result of this estimate showed that the 30-ft. channel would cost at least $125,000,000 more than the 21-ft. channel and offered no commercial advantages at all proportionate to this excess of cost. The larger waterway would be of smaller traffic capacity than the 21-ft. channel, on account of the difference of time spent in lockage, and this factor also about neutralizes the higher speed which smaller vessels could make in the larger waterway in the reaches between locks. The fact that all the lake harbors and channels, as well as the docks, piers,, etc., are designed for the vessels of moderate draught now navigating the lakes, is another fact showing the inferiority of the 30-ft. channel as a commercial proposition to the channel of 21 ft. depth.

Turning now to the matter of route: Complete surveys and estimates were made for waterways by the St. Lawrence and Lake Champlain route and also by the route across the state of New York from Lake Ontario via the Oswego and Mohawk rivers. The route from Lake Erie direct to the Hudson was not surveyed, as it is well known to be only feasible for a barge canal. A waterway of even 21 ft. depth by this route would be so enormously expensive and involve such engineering difficulties as would make it impracticable. These careful surveys and estimates fully establish the superiority of the route via Lake Ontario and the Oswego and Mohawk rivers. While the cost of building a canal by the Champlain route is a little less, the much greater distance, the shorter season of navigation and other conditions prove the Oswego-Mohawk route to be the preferable one.

This route, beginning at Buffalo, follows down the Niagara river to Lasalle, 15 miles. Here the canal proper begins and continues for about 10 miles to the Niagara escarpment, which is descended by a series of locks to the lower level of the Niagara river below the gorge. There are nine locks in all between the level of Lake Erie and that of Lake Ontario, the difference of elevation being 330 ft. Leaving the lowest lock of the series, a vessel would enter the lower Niagara river, which is deep enough and wide enough for any ship afloat, and it follows down the river—which is really an arm of Lake Ontario—till it debouches into the lake, six miles below. Thence the vessel proceeds through Lake Ontario to Oswego, distant about 100 miles from the mouth of the Niagara river. From Oswego the route is up the valley of the Oswego river, partly in an excavated channel, to the village of Fulton, where it turns up the valley of a small creek and continues across sand ridges to Oneida lake. The total distance from Lake Ontario to Lake Oneida is about 26 miles. The vessel then passes through Lake Oneida, a distance of about 21 miles, and then enters the longest section of excavated canal encountered, that from Lake Oneida to the Mohawk river at Herkimer, N. Y., a distance of 43 miles. From Herkimer to near Rotterdam Junction, 55 miles, the Mohawk river is to be used, being converted by dams and locks into a system of slack-water navigation. Over a large part of this distance the vessel will be in a channel of such depths and width that she can make as good time as on the open lake. At Rotterdam junction, the route leaves the Mohawk and passes through South Schenectady to the head of a small stream known as Norman's Kill. It follows the valley of this stream to the Hudson. Below this point about $4,000,000 will have to be spent on the Hudson river from the mouth of Norman's Kill to Hudson City to secure a 21-ft. channel.

So much for the general route to be followed. The particular feature of this route which most deserves attention is that it is a utilization of natural waterways and not an artificial channel. Of the total distance from Buffalo to New York (477 miles) only 102 miles are in standard canal section, and 98 miles are in canalized rivers from 250 to 1,000 ft. in width. The remaining 277 miles are in open lakes and rivers where a vessel can make nearly or quite as good time as she can on the open waters of Lake Erie or Lake Huron. This, taken in connection with the liberal size adopted for the canal section, will enable vessels to make a very high speed on this route. The estimates have been worked out with the greatest care, from the known time occupied by vessels in passing the Sault lock and the St. Clair canal, checking them by the most thorough investigation of all available data of the speed of vessels in existing ship-canals. The result shows that a vessel of 11,700 tons displacement and 8,600 tons cargo capacity would take only sixty-four hours to make the passage from Buffalo to New York city, 477 miles. About seven hours are required for the passage from Buffalo through the Niagara river and down the flight of locks to Lake Ontario; eleven hours more through the open waters of Lake Ontario bring the vessel to Oswego. About seventeen hours are then required for the passage up the Oswego valley and through the long canal section to the pools of the Mohawk river (of which about two hours are spent in traversing the open waters of Lake Oneida). Then nine and one-half hours are required for the passage down the Mohawk Valley, eight hours for the passage from there to the Hudson and twelve hours for the run down the Hudson to New York.

The total estimated cost of constructing the 21-ft. waterway from Buffalo to New York is in round numbers $200,000,000 ($190,400,000). Of this total about $42,000,000 is the cost of the division from Lake Erie to Lake Ontario, and the balance the cost from Lake Ontario to deep water in the Hudson river. Again, of the total cost of $200,000,000, almost exactly half is for the item of excavation; locks cost $36,000,000; right of way $12,500,000, and retaining walls, slope walls and back filling, $11,000,000. An allowance of 10 per cent for engineering, superintendence and contingencies was made on all items.

The proposed canal is to have a bottom width of 240 ft. in rock and of 215 ft. in earth, and the width is increased on curves. The section was designed after careful studies of experience on the St. Clair flats canal and the Suez, Manchester, Amsterdam and Kiel ship-canals to permit a speed of 8 miles per hour on tangents without danger to passing ships or damage to canal banks. On open rivers where the channel banks are not defined, a bottom width of 600 ft. has been adopted for safe navigation. The depth of 21 ft., it may be stated, is designed to leave a depth of 2 ft. under the keel of loaded vessels, and will permit the passage of any vessels navigating the great lakes, for none of

the lake harbors have now over 20 ft. depth of water, and many have only 16 to 19 ft.

The locks are to be each 600 ft. long, 60 ft. wide and with lifts varying according to topographical conditions. The locks at the Niagara escarpment have a lift of 40 ft. each. Where flights of locks are used, the locks are in duplicate throughout. The lock-gates are to be steel double-leaf miter gates with horizontal girder frames.

The annual cost of maintenance and operation of the waterway is estimated by the commission at $2,343,478, which, it may be parenthetically remarked, is not so very much more than the state of New York now pays to maintain the old Erie canal. The maximum annual traffic capacity is estimated at 36,608,000 tons, when all the locks are made in duplicate. The probable traffic is not likely to exceed 10,000,000 to 20,000,000 tons. It may be noted that the speed provided would make quicker passage for freight from Chicago or Duluth to New York than is now attained by railway freight in passing between these terminals.

FAVORS THE 1,000-TON BARGE CANAL.

Of course the views of the Engineering News in the foregoing article are at variance with those of very competent authorities, especially Maj. Thomas W. Symons. Mr. Gustav H. Schwab of New York also believes the Engineering News to be wrong in its conclusions. In a communication to the New York Tribune, he says that it is incontestably true that the lake steamer could not compete in canal traffic with the cheap canal barge, as the cost of construction, as well as the cost of maintenance, of the lake steamer is far in excess of that of the canal barge or fleet of barges. He continues:

"But there is another potent reason why the 21-ft. canal designed as a waterway for lake steamers from the western lake cities to New York would, in the opinion of those who have carefully examined this question, not fulfill its purpose. At the present day the lake steamer, laden with grain from the upper lake ports, on reaching Buffalo discharges her cargo alongside and into a shore elevator, whence the grain is transferred to canal boats that proceed to New York and deliver their cargo alongside and into the ocean steamer through floating elevators. Should the lake steamer take the place of the canal barge and carry the grain through to New York, she could not transship her grain directly into an ocean steamer, as she could not go alongside the ocean steamer, owing to the conditions in New York harbor and for other reasons; but there would necessarily be an intermediate transfer from the lake steamer into a barge or boat, whence the grain would be conveyed to the ocean steamer, being pumped into her hold through a floating elevator. There would, therefore, be no gain whatever in a through shipment from the western lake ports to New York, but, on the contrary, as transfer charges on grain in New York are considerably higher than in Buffalo, there would be an increased expense, raising the cost of the transportation charge on the grain.

"Andrew Carnegie has made the following statement in this connection: 'It would never pay to run big ships from Buffalo to New York through any canal, not even a ship-canal. It is much cheaper to transfer from a 10,000-ton lake vessel to a 1,000-ton barge, and send it through the canal at low speed, to be unloaded alongside into ocean-going ships, than to send ocean or lake vessels through the canal.'"

Concerning the ability of the lake steamer to engage during the winter in ocean traffic, Mr. Schwab says:

"Any one familiar with the construction of lake and ocean steamers respectively would not consider such winter use of lake steamers in ocean coastwise traffic practicable, and the underwriters would certainly not take any risks on such steamers. The insurance companies declare that the lake steamers of the present day are totally unfit for ocean navigation of any kind during the winter season. To secure the ability of the steamers to navigate the ocean, even in coastwise service, as well as the lakes, they would require to be of much heavier construction and of different design, very materially enhancing their cost. I may say here that those familiar with ocean shipping entirely disagree with the views quoted in the deep waterways commission's report on this subject. However, there are other and far stronger reasons why this 21-ft. ship-canal proposition should not receive the countenance of the people of New York. The construction of such a canal, it is universally assumed, would be a subject to be undertaken by the national government, and this would necessarily involve the abandonment or the transfer of the Erie canal to the United States government. On this subject I cannot do better than quote from the remarks made by Hon. Abram S. Hewitt at the meeting of the Chamber of Commerce of the State of New York, Mar. 24, 1898, in opposition to a resolution which was introduced in the chamber permitting New York to sell, lease, or otherwise dispose of the canals to the United States. Mr. Hewitt on this occasion uttered the following solemn and emphatic warning:

"'When we transfer the Erie canal to the custody of the United States, it passes out of the control of its friends into the hands, possibly, of its enemies, and certainly into the hands of its rivals. Nothing that may be done in the way of construction of new routes to the gulf or to the Atlantic by the government of the United States or by other states, or by private enterprises, can, by any possibility, interfere with the ability of New York to take care of itself by the enlargement of the canal, if necessary, to a 1,500-ton barge capacity. That is our privilege; that is our right; that is our duty. When you turn this right and privilege and duty over to congress, in what shape will it be found? The appropriation for the maintenance of the canal must be made in the river and harbor bill. If, by any possibility, the bill should fail for a single year, there would be no money to maintain the canal as a free highway. And more than that, if the proposition is made for congress to spend the money to enlarge the canal, or for its annual maintenance, you ask the gentlemen who, by your own confession, are profiting by the present condition of the canal, its insufficiency to do the work—you ask them to vote the money of the United States to build up the port of New York and to help the merchants and shipping of New York; and how much sympathy are you going to get from these rival cities on the gulf and on the Atlantic shore? Do you suppose they are going to spend the money of the United States to enable New York to do the work cheaper than they can? The result would be that the canal would not be maintained, even if it were once constructed, which I am sure from my knowledge of national affairs will never be the fact; but, if it were constructed, it would very soon be abandoned, it would cease to be maintained, and we should be left without redress—without remedy of any kind whatever.'

"The people of New York should carefully ponder these words of Mr. Hewitt. I for one believe that if this question is put before them with all the facts necessary for their judgment, the people will in no uncertain tone decide against a national ship-canal and in favor of the 1,000-ton barge plan, which is the result of the most careful investigation and research on the part of competent engineers and business men during the last four years."

LAKE MICHIGAN GRAIN SITUATION.

In a letter to the correspondents around the lakes, P. H. Fleming & Co., vessel agents of Chicago, make the following summary of grain in store at Chicago, South Chicago and Milwaukee:

	Week of Mar. 14, 1903.	Same week. in 1902.
Wheat	11,576,268	11,767,950
Corn	7,477,178	7,604,610
Oats	4,442,586	2,279,508
Other grain	1,150,000	1,300,000
Total	24,646,032	22,952,068

The Chicago agents estimate that there is now afloat 3,500,000 bu., compared with 2,680,000 bu. on the same date a year ago. On Jan. 15 last, when there was practically no grain afloat, the stocks in elevators aggregated only 18,251,230 bu., so that there has been an increase in stocks of more than 6,000,000 bu. since the middle of January, not including the 3,500,000 bu. afloat, which exceeds the grain afloat last year. The movement of wheat and oats has been normal, but open weather conditions and car shortage have developed a peculiar and congested condition in corn, relief from which is expected only in an early opening of navigation. It would seem that there should be a very heavy movement of corn in June, but predictions as to grain freights at this time, even with the expectation of a fair movement of grain from Lake Superior ports, would be hazardous in the absence of a settlement of ore-freight contracts and information as to the extent to which the lake fleet will be tied up by these contracts.

A BIT OF EARLY LAKE SUPERIOR HISTORY.

Mr. John G. Parker, one of the oldest residents of the upper peninsula of Michigan, writing to the Review says:

"I receive the Review every Saturday night and I take pleasure in reading it. I see a photo in the Review of Capt. George P. McKay. In the summer of 1846 his father sailed the schooner Napoleon. John Hellerand, mate, was landing freight in his yawl, only 5 ft. of water being in Ontonogan river. It came on to blow, the boat could not get back and the crew stayed with us on the Fur Trader, of which Capt. Ripley was master. I was mate of the Fur Trader. Capt. McKay let go anchor, stood off in the lake and hove to until the sea went down. His son, George, was cabin boy. When they came back they finished landing the freight."

On the recommendation of Supt. Kimball of the life saving service, the secretary of the treasury has forwarded a gold life saving medal to Keeper George N. Gray of the life saving station at Charlotte, Lake Ontario, for "extreme and heroic daring in saving life from the perils of the sea." On Dec. 15, 1902, Gray, with his crew, in the face of extreme personal danger, effected the rescue of four men and one woman from the schooner John R. Noyes, which was wrecked twenty-three miles from the Charlotte station. Gray and his men were under oars constantly for fifteen hours, rowing about sixty miles in an open boat and in a heavy winter sea. This rescue is regarded by Supt. Kimball as one of the most remarkable in the history of the service.

Mutual Transportation Co. is the name of the organization that is to operate the six freight steamers recently purchased from the Northern Steamship Co. by a syndicate representing the line boat interests of Buffalo. Gibson L. Douglas is manager of the new line.

MARITIME MAN IN A NEW ROLE.

The Republican party of Cleveland, being sadly in need of a candidate for mayor, has invaded the maritime ranks and seized upon the counsel of the Lake Carriers' Association, up to his ears in work and likely to be so until he can no longer wag his eyelids. They have saddled upon him the irksome necessity of making a campaign which, if he is defeated, will have its inevitable sting, and if he is elected, will constitute a calamity in the eyes of many vesselmen too appalling to be mentioned. For nothing can happen on the great lakes of North America which has any potentiality for litigation whatever that both sides to the controversy do not pelt to the wire with their tongues hanging out for want of breath and engage the services of Harvey D. Goulder. Goulder did not want the nomination for mayor; but there is a certain excitement about a political convention and a certain irresistibility of a thousand minds acting in unison upon one mind. It grips the emotions powerfully and bends men to its will. Goulder bowed also. Then there was a scene. A prominent iron man rushed up, clasped him about the neck and promised that his work should not suffer; delegation after delegation promised that it should not suffer; though exactly in what way it is going to be done is not clear. Does the prominent iron man intend to take Mr. Goulder's cases into court? If he does, depend upon it he will cut a sorry figure. However, the die is cast and one must stand the hazard of the throw. Mr. Goulder intends to make an energetic campaign and will probably work all day and talk all night. Meanwhile the vessel interests of the great lakes will have their eyes directed to the mayorality of Cleveland and will watch the gradual evolution of the campaign with the same earnestness that they follow the changes in the rate of freights.

DULUTH VIEWS AS TO FREIGHTS.

Duluth, Mar. 18.—Grain continues to arrive at head of the lake elevators in considerable quantity, and there will probably be about 8,000,000 bu. of wheat, 4,000,000 bu. of flax and 3,000,000 bu. of oats, rye and barley at the opening of navigation. So far there is very little inquiry for vessel room for Duluth wheat, and not much inquiry for room for Duluth flax or oats, but considerable of Manitoba wheat in store at Port Arthur and Fort William is offered to vessels. Railway warehouses are full of Minneapolis flour, which the railroads do not report as in store. The ore movement from mines to docks will begin early next month. The nineteen heavy locomotives sent by Duluth ore roads to Pittsburg for the winter are returning now.

It is rumored here that some of the vessel interests that have many ships in the Duluth trade will provide their own tugs this season if there is any great danger of trouble between the towing company and the unions. These interests have, in the past, and when their vessels were less numerous than now, maintained a tug or two here.

Neither the Duluth & Iron Range nor the Duluth, Mesabi & Northern roads expect to handle much more ore this year than last. There will be a number of new shipping mines that will increase the amount to be moved but a few old ones will be idle. Among these latter are the Penobscot, Hale and Roberts. The new properties will, for the most part, ship via the Great Northern, for they are operated by independent concerns who were able to make bargains with that road and secure in return for traffic concessions as to lands, etc., which the other roads were not in a position to give. They had no ore bearing lands to give out to others for mining purposes. The Great Northern will increase its shipments materially over last year, but not in so large a proportion as then, and several mines that have shipped over that road will probably change to other lines. Ore men do not expect the rate of freight for ore to be much over last year, perhaps 80 cents, possibly 85, though some of them say it would not surprise them to see it at some time during the season down to 75 cents a ton. There has been a greater increase in vessel capacity than in ore to be carried, they claim. Railroad men do not look for any considerable ore movement until April 10 to 15.

When the Duluth, Mesabi & Northern extends its No. 3 ore dock next winter it may use some steel and some concrete in the work, particularly on the floors. Such a plan is under consideration at this time and is liable to be carried out unless lumber takes a decided drop in the meantime, which is improbable.

BIG CONCRETE JOB.

Duluth, Minn., Mar. 18.—When it came to opening bids, a few days ago, for the large job of concrete pier work at Superior entry the government engineer office here found the appropriation exceeded by $70,000. It was proposed to expend $250,000 on this job, which involves the building in place of 43,000 cu. yds. of concrete, together with the excavation or refilling of 5,000 yds. of sand on the bottom of the pier trench. The lowest bid, that of the Lake Superior Contracting & Dredging Co. of Duluth, was $321,420. Hugo & Tims of Duluth bid $374,450, while the bid of Butler Bros., St. Paul, was $441,450 and that of Porter Bros., Duluth, $393,800. Under the terms of the appropriation the work should be done by contract and the situation is therefore embarrassing to the local engineer. It is thought that with the approval of the board of government engineers having to do with such matters, the secretary of war can authorize the engineer's office here to have the work done by day labor, and it is for this change that Capt. Gaillard, engineer in charge, is now in Washington. The local engineering force claims that it can save the $70,000 by doing the work itself. They say that the job presents so many features new to contractors, in the large amount of under-water concrete erection and in other respects, that they all figured very heavily for contingencies. The government engineer's office here has had more experience with concrete construction than any other engineering organization, government or private, in the United States, and has invented some machines for this under-water work that it feels sure will make a large saving. The engineers therefore hope that the work will be carried out by day labor. In case it is not, the office here will very probably modify its plans for a cheaper structure. The present job is the biggest of a concrete kind ever undertaken in America. Contracts for all work on the south pier preliminary to this job of the placing of concrete have been let. The material for concrete has been purchased and will be delivered early in the navigation season.

A STATISTICAL CHART.

A chart containing a variety of statistical information regarding the great lakes for the season of 1902 has been prepared by the weather bureau. It gives a list of storms of the season, contains a table dealing with the atmospheric precipitation and lake levels, a report on the opening and closing of navigation, a list of wrecks and casualties, with the number of lives lost and the value of property destroyed. The chart shows that 166 vessels were damaged to a greater or less extent; twenty-three became total losses and passed into history; eleven vessels became total losses through causes other than the weather. The estimated amount of losses for the season was $1,365,300, of which amount $816,800 was in total losses and the remainder in partial losses. The number of lives lost through stormy weather during the season was 111: other causes, 126. By lakes the record was as follows: Lake Superior, weather twenty-two, other causes twenty-four; Lake Michigan, weather thirteen, other causes twenty-four: Lake Huron, weather eighteen, other causes nine: Lake Erie easily tops all the others with the grim record of forty-four lives sacrificed through stress of weather and thirty-three from other causes. On Lake Ontario the number of lives lost on account of weather was ten, other causes eleven: Lake St. Clair and connecting rivers, weather four, other causes twenty-five. The loss of life from other causes includes that by reason of capsizing of small boats, falling from docks, vessels, etc. The greatest loss of life in one disaster occurred in the foundering of the Canadian steamer Bannockburn on Lake Superior, when twenty persons went down with the vessel.

The total number of vessel passages at Detroit during the season of navigation as noted on the chart was 22,825. This is 2,291 more than the season of 1901.

CONDITION OF ICE ON THE LAKES.

The latest bulletin on the condition of ice on the great lakes issued by Norman B. Conger, inspector and marine agent of the United States weather bureau at Detroit, indicates that the ice has decreased rapidly during the week under the influence of warm weather and rain. The Duluth entry is open but the pack ice remains along Minnesota point and the south shore. The fields extend out from Keweenaw point, but over the eastern portion of Lake Superior the ice fields have moved out of sight into the lake. Whitefish bay is softening up with some open water spaces. Ice in the St. Mary's river has decreased about 5 in. and is honeycombing and discoloring. Over Green bay the ice is softening rapidly over the southern portion and decreasing and softening over the northern portion. In Lake Michigan no ice is reported on the west shore, and the ice fields on the east side have decreased materially and offer no obstruction to navigation. At the Straits of Mackinaw the ice is becoming thin and soft and will break up with high wind. But little ice is reported over the northern portion of Lake Michigan, and the east end of the straits is clear of ice. No ice is reported in Lake Huron except small broken fields on the east shore. Some soft ice has been running in the Detroit river during the week from the east side of Lake St. Clair. No ice is reported over the extreme west end of Lake Erie, except about Bass island. Fields over the eastern end of this lake are honeycombing and becoming soft, and will probably break up with high easterly winds. On Lake Ontario the ice is confined to the extreme east end.

In comparison with the same period last year the conditions over Lake Superior are about the same; a little more ice reported in Whitefish bay; ice in St. Mary's river 2 in. thicker; at the straits conditions more favorable than last season; in the other lakes conditions about the same.

Ice conditions at the straits are favorable for an opening about April 1, but with high winds and continued warm weather the ice may move out the last of March. In St. Mary's river the ice can be broken up about the first week in April.

Stewards' Protective Association is the name of the latest maritime association. It is to embrace the stewards of passenger lines, including the chiefs on shore.

APPOINTMENTS OF CAPTAINS AND ENGINEERS.

Cleveland Cliffs Iron Co., J. H. Sheadle, Mgr., Cleveland: Steamers—Pontiac, Capt. John M. Johnson, Engineer T. J. Rees; Frontenac, Capt. G. D. Tulian, Engineer J. B. Hart; Cadillac, Capt. Chas. A. Anderson, Engineer C. H. Menmuir; Choctaw, Capt. H. H. Parsons, Engineer Thos. Durkin; Andaste, Capt. C. E. Sayre, Engineer Wm. Donovan; Pioneer, Capt. Geo. B. Brock, Engineer Wm. Naylor; Falcon, Capt. J. C. Dobson, Engineer H. S. Connell. Schooner Chattanooga, A. C. Reimer.

Sheadle, J. H., Mgr., Hopkins Steamship Co., Cleveland: Steamer—Centurian, Capt. S. A. Lyons, Engineer Thos. B. Kelley.

Sheadle, J. H., Mgr., St. Clair Steamship Co., Cleveland: Steamer—Kaliyuga, Capt. Thos. E. Murray, Engineer M. A. Lloyd.

Sheadle, J. H., Mgr., Presque Isle Trans. Co., Cleveland: Steamers—Presque Isle, Capt. James B. Lowe, Engineer Thos. Blain; Angeline, Capt. S. N. Murphy, Engineer E. V. Barry.

Tonawanda Iron & Steel Co., N. Tonawanda, N. Y.: Steamers—Fleetwood, Capt. O. J. Solean, Engineer Harvey DePuy; Geo. Spencer, Capt. A. C. Hansen, Engineer W. J. Cunningham; C. F. Curtis, Capt. Thos. Deringer, Engineer H. D. Fifield; John F. Eddy, Capt. C. S. Furey, Engineer Frank Trinkwalder; Oceanica, Capt. John Hesson, Engineer E. D. Knibbs; Veronica, Capt. Jas. A. Fleck, Engineer A. J. Schryver; Clyde, Capt. A. C. Neal, Engineer E. H. Parry. Schooners—B. L. Pennington, Capt. W. P. Johnson; Moravia, Capt. Peter Keisch; N. C. Holland, Capt. J. H. Christie; T. S. Fassett, Capt. R. McCarquodale; 101, Capt. J. J. Carr; Amboy, Capt. F. P. McGreevey.

Peavey Steamship Co., Duluth: Steamers—Frank H. Peavey, Capt. C. C. Balfour, Engineer James Patterson; Geo. W. Peavey, Capt. F. C. Rae, Engineer A. L. Roberts; Frank T. Heffelfinger, Capt. L. A. Rand, Engineer Theo. A. Myers; Frederick B. Wells, Capt. L. W. Stone, Engineer Geo. A. Gardener.

Young, W. D., Mgr., W. Bay City, Mich.: Steamer—Arizona, Capt. J. G. Sauer, Engineer W. H. Phillips. Schooners—Scotia, Capt. Geo. J. Sauer; Plymouth, Capt. John Jorgorson.

Kinsman Transit Co., Henry Steinbrenner, Mgr., Cleveland: Steamers—Henry Steinbrenner, Capt. Joseph Lampoh, Engineer Charles R. Price; Anna C. Minch, Capt. Harry Gunderson, Engineer Wm. H. Miller.

Northern Steamship Co., Buffalo: Steamers—North West, Capt. G. A. Miner, Engineer A. T. Stewart; North Land, Capt. J. J. Hartman, Engineer M. N. McDonald.

AROUND THE GREAT LAKES.

Capt. Hugh J. Hagan, who sailed the Davidson steamer Bermuda last season, has been appointed master of one of the new steamers of the Great Lakes & St. Lawrence Transportation Co.

In a few days the light at St. Joseph, Mich., will be re-established and its characteristic will be flashing white every 30 seconds, instead of fixed white varied by a white flash every 45 seconds, as heretofore.

Mr. Richard A. Seymour, one of the pioneer lumbermen of Manistee and part owner in the Northern Michigan Transportation Co., formerly known as the Seymour Line, whose boats ply between Chicago and Mackinac, died a few days ago. He was fifty-nine years old.

In addition to the usual large placard containing regulations, rates, etc., agreed upon by the owners of dry docks on the lakes, the managers of the docks have this year issued a pocket folder in which this information is repeated. There is no change from last year in either rules or rates.

A Chicago dispatch announces that the work of constructing turning basins in the Chicago river, for which the late congress appropriated $500,000, will be begun as soon as the frost is out of the ground. The basins will be large enough for the largest boats on the lakes to turn around in and will add greatly to the facilities of the river.

Capt. Frank C. Roe, who sailed the steamer Princeton of the Pittsburg Steamship Co.'s fleet in 1901, but who was in business ashore last season, has been appointed master of the steamer George Peavey. Capt. Wesley Brown, who was in the Peavey last year, will command one of the steamers building for the Provident Steamship Co.

The collision case resulting from the sinking near Duluth of the Steel Corporation steamer Wilson will probably be the first action in admiralty to be heard in the United States district court at Duluth, just established, before the new judge, Page Morris. The new judge is quite well known to admiralty lawyers around the lakes and is highly spoken of.

Package freight lines out of Buffalo are now arranging their schedule of operations. It is their purpose to give a fast through service from Lake Erie to Lake Superior, and only one of the lines, the Anchor, will hereafter stop at Detroit. This line will handle all the business of that city. Other plans for economizing operations by preventing the duplication of service are under way.

Laborers employed in the construction of the new dry dock of the Collinwood Ship Building Co. went out on strike recently, asking for a raise in wages of 50 cents per day. The laborers employed in the construction of the new vessels also quit work without notice, leaving their tools lying about the yard. Owing to the action of the laborers work in other departments of the ship yard has been crippled.

Capt. James Doner of Detroit has been appointed master of the Provident Steamship Co.'s steamer James H. Hoyt, and W. A. Moudy chief engineer. E. P. Houghton, E. D. Ballentine and W. C. Brown have been appointed to command the three big steamers building in lake yards for the Provident company. The names D. M. Clemson and D. G. Kerr have been selected for two of these steamers but the third one has not been named as yet.

Announcement is made that on April 1 James C. Evans, for the last decade representative of the Anchor Line in Chicago, will become the line's general western manager with offices at Buffalo. Mr. Evans succeeds his father, Mr. E. T. Evans, who has been elected vice-president of the company. Mr. W. H. Johnson, the company's agent at Buffalo, has been made western agent with headquarters at Chicago. Mr. A. M. Willard is to be the company's agent at Milwaukee.

Alterations which the Lake Erie Boiler Works at Buffalo is making in arrangements attending boiler rooms, dynamo rooms, refrigerator compartments, etc., on the big Northern Line passenger steamers North West and North Land are being hurried and the vessels will be ready for service when they are needed. It is said that they will open the season about June 14 and that one of the boats will trade to Duluth, stopping at the Sault, Marquette and Hancock. The other steamer will be placed on the Chicago route stopping at Mackinaw.

Following its policy of disposing of its break-bulk business across Lake Michigan the Pere Marquette railway has sold its steamer Pere Marquette No. 4 to Gustav Kitzinger of Manistee, who some weeks ago purchased Nos. 2 and 3 of the same line. The only remaining break-bulk boat now owned by the company is the No. 5, which will be kept for a time on the Milwaukee-Ottawa beach route. It is understood that a traffic agreement has been made with the Goodrich Line, by which the latter will not compete with the east shore business of the Kitzinger steamers on condition that the Chicago business of the Goodrich Line is not interfered with.

Congressman Minor of Wisconsin managed to secure in the sundry civil appropriation bill passed by the last congress an appropriation of $8,000 for telegraph or telephone communication that is to facilitate life saving operations in the vicinity of Death's Door, Lake Michigan. The appropriation item reads: "For constructing and establishing, under the direction of the secretary of the treasury, cable or telegraph line or lines from the mainland forming the eastern side of Green bay, across Death's Door to the Plum island life saving station, and from the said Plum island life saving station across Washington island, thence to Rock island, terminating at the light house on said island; said line or lines to be operated under the direction of the secretary of the treasury for the use of the life saving service; and the weather bureau shall be entitled to the use of said line or lines under such regulations as may be agreed upon by the secretary of the treasury and the secretary of agriculture."

BANKING BY MAIL.

One of the officers of the Federal Trust Co., Superior and Water streets, Cleveland, in which J. C. Gilchrist, Frank W. Hart, F. M. Osborne and other well-known vessel owners are directors, says that his bank has for some time been doing quite a large business in savings accounts with the men aboard lake vessels, by means of what is known as the "banking by mail" system. This system offers special advantages to the captains, mates, engineers, and in fact all the men on lake vessels who are away from their homes during the greater part of the year. It permits of accounts being carried by these men with the most substantial banking institutions of large cities such as the Federal company, and often with even less trouble than is experienced by the depositor who calls with his bank book. In the ordinary practice a trip to the bank is not all the time convenient, while with the mail method there is every assurance of equal security with only trifling additional cost for postage or for mail or express money orders. The bank officials say they have never lost a dollar nor heard of a dollar being lost by this method. Of course the success of the "banking by mail" system is due to the ease with which money may be handled by the use of postoffice money orders, express orders, etc. In opening an account any amount from $1 up is forwarded to the bank by postoffice order, express money order, draft on New York, check on any bank, or if currency, by registered letter. A card is then forwarded by the bank to the depositor for his signature and with it a pass book. The card, signed and returned to the bank, is for identification. The pass book is afterward mailed with every order and with every request for money to be withdrawn. Very small accounts are encouraged as much so as the large ones and the bankers say that the extent to which the system is used, and the ease and security attending its use, are wonderful.

Tours across the continent tri-weekly via the Nickel Plate road. All travel comforts. Very low rates. Apply to nearest agent or address E. A. Akers, C. P. & T. A., Cleveland, Ohio. 22, Apr. 13

Warship Construction during 1902.

[From the New York Times in arrangement with London Times]

During the past year the foreign powers have, with hardly an exception, continued to advance the work of programs which have been previously announced. The French program, which extends to 1906-7, has already had several of its features altered, and, owing to modifications of policy introduced by M. Pelletan, it is highly probable that several of its provisions will not be fulfilled by the dates originally fixed. In Germany, the program, which makes provision for the development and replacement of the navy as far ahead as 1916, has been hitherto adhered to with characteristic continuity of purpose; a further installment is now announced. The Russian program, published in 1898-9, covered a seven years' period, and all the vessels contemplated in it are completed or in hand, while it is reported that a further program will shortly be issued. The Italian program, extending from 1901 to 1912, provides for five new battleships, the names of which will be found in the tables below, but there are still two battleships belonging to a previous program to complete, and it is doubtful if the financial resources of the country will enable the government to finish the contemplated construction by the dates originally determined. As regards the United States, there is no fixed program which has been published, but it may be assumed that the recommendations of the naval board of construction are based on some prearranged and consistent policy. So far back as 1890 it was proposed that twenty battleships and sixty large cruisers should be the standard of effective strength aimed at when arranging the annual programs. Including the five battleships launched previous to 1898 there are already completed or in hand twenty battleships, and, in addition, two more have been recommended by the naval board of construction for this year. The armored cruisers of the United States completed, building, or projected are fifteen in number without those which have yet to receive the sanction of the government. Japan, the only other first-class naval power, has completed the program of naval construction of 1895-6, consisting of six battleships and eleven cruisers, and it is now reported that another six years' program has been decided upon. If this report be well founded, we may expect, judging from the vigorous way in which the last program was pushed forward, to see the naval power of the far east with an additional four battleships and six armored cruisers and a suitable number of smaller craft by the end of the first decade of this century.

FRANCE.

Dealing severally with the work of the year in the different countries France naturally occupies the first place, although the advance she has made is not so marked as that of some other powers. Since the beginning of the year three battleships have been completed for sea, aggregating 33,728 tons. Of these ships the Henri IV. has been in hand since 1897, the Jena since 1898 and the Suffren since 1899. All these three ships have already hoisted the pennant. The armored cruiser Montcalm, which dates from 1897, and was built by contract, has been completed and commissioned, while the armored cruiser Marseillaise, launched in 1900, has been under trial. The Jeanne d'Arc has also been completed. The protected cruiser Chateaurenault has been accepted after a long series of trials. Among the small craft added to the navy during 1902 are the torpedo boat destroyers Pertuisane, Escorpette, and Rapiere, and the seagoing torpedo boats Bourrasque, Rafale, and Tramontane. The destroyers Carabine, Harpon, Mousquet, Javeline, Belier, and Pistolet have been launched, and several others of similar types have been advanced. Upward of forty submarine boats of various types are also in course of trial, under construction, or advancing to completion. The following list contains the names of the French battleships and armored cruisers completed, constructing or projected during the past year:

Name and where built or building.	Displacement.	Date when begun, launched, or completed.
Battleships.		
Jena, Brest	12,052	L. Sept. 1, 1898
Republique, Brest	14,865	L. Sept. 4, 1902
Suffren, Brest	14,738	Completed 1902
Henri IV., Cherbourg	8,948	Completed 1899
Liberte, Cherbourg	14,865	Begun 1902
Justice, Cherbourg	14,865	Begun 1902
Verite, Cherbourg	14,865	Begun 1902
Democratie, Cherbourg	14,865	Begun 1902
Patrie, Cherbourg	14,865	Begun 1902
Armored Cruisers.		
Montcalm, La Seyne	9,517	Completed 1902
Admiral Aube, St. Nazaire	10,000	Begun 1900
Conde, Lorient	10,000	Begun 1901
Kleber, Bordeaux	7,700	L. Sept. 24, 1902
Jules Ferry, Cherbourg	12,416	Begun 1902
Leon Gambetta, Brest	12,416	Begun 1901
Victor Hugo, Toulon	12,416	Begun 1902
Dupetit Thouars, Toulon	9,516	L. July 5, 1901
Admiral Gueydon, Lorient	9,516	L. Sept. 20, 1899
Sully, La Seyne	10,000	L. June 4, 1902
Gloire, Lorient	10,000	L. July 27, 1900
Marseillaise, Brest	10,000	L. Aug. 14, 1900
Desaix, St. Nazaire	7,700	Begun 1902
Dupleix, Rochefort	7,700	L. April 28, 1900
*Ernest Renan, St. Nazaire	12,550	.....
Jules Michelet, Lorient	12,550	Begun 1902

*An improved type of armored cruiser, displacing 13,000 tons, with a speed of 24 knots, is under consideration and may be substituted for the Ernest Renan

GERMANY.

The number of vessels launched from German yards was very noteworthy in 1901, no less than five battleships taking the water. But last year only one battleship was launched, the Braunschweig, the first of four ships of the same class under construction, the other three being known at present as J, K and L. Of the five battleships of the Wittelsbach type, three, the Wittelsbach, Wettin, and Zahringen, have been completed and commissioned, and two others, the Mecklenburg and Schwaben, are to be completed early this year. The last of the battleships of the Kaiser class, the Karl der Grosse was completed last year, and the five ships of that class were, it will be remembered, in the squadron under the command of Prince Henry of Prussia which visited the British Isles in the summer. Of armored cruisers, the Prinz Heinrich has been completed and commissioned, and the Prinz Adalbert has been under trial; another vessel of this class, the Prinz Friedrich Carl, hitherto known as the Ersatz Konig Wilhelm, has been launched. A comparison of these vessels with armored cruisers of other powers was published in the naval annual for 1902. A vessel of similar dimensions and features, the Ersatz Kaiser, is under construction. Three protected cruisers of an improved Niobe type have been launched, the Frauenlob and Arkona from the Weser yard, Bremen, and the Undine, at the Howaldt yard, Kiel; three others, K, L, and Ersatz Zieten, were laid down last year. The displacement of these vessels is 2,715 metric tons, and the anticipated speed 23-24 knots. Among the small craft the torpedo boats S114-119 have been completed at Schichau's yard, Elbing. Two gunboats have been put in hand. The next installment of the program should consist of two battleships, one armored and two protected cruisers, and another division of torpedo boats. The following list contains the names of the battleships and armored cruisers completed, constructing, or projected during the past year:

Name and where built or building.	Displacement.	Date when begun, launched or completed.
Battleships.		
K. Karl der Grosse, Keil	11,130	Completed 1902
Wittelsbach, Wilhelmshaven	12,000	Completed 1902
Wettin, Schichau	12,000	Completed 1902
Braunschweig, H., Kiel	13,208	L. Dec. 20, 1902
J. Schichau	13,208	Begun 1901
K, Stettin	13,208	Begun 1901
L, Germania	13,208	Begun 1901
Mecklenburg, Stettin	12,000	Begun 1900
Zahringen, Kiel	12,000	Begun 1899
Schwaben, Schichau	12,000	Begun 1900
Armored Cruisers.		
P. Heinrich, Kiel	8,868	L. Mar. 22, 1900
P. Adalbert, Kiel	8,800	Begun 1900
P. Friedrich Carl, Wilhelmshaven	8,800	Begun 1900
Ersatz Kaiser, Kiel	9,050	Begun 1902

RUSSIA.

The small squadron of Russian ships recently at Portland have all been completed during the past year, and have since entered the Mediterranean on their way to the far east. The squadron consisted of two battleships, the Pobieda and Retvisan, and four protected cruisers, the Diana, Pallada, Boyarin, and Bogatyr. The Novik, sister to the Boyarin, has been completed, the Aurora, sister to the Diana and Pallada, is nearly completed, and the Askold, of the Bogatyr type, has made her trials. Of the two ships built for the Russian navy in France the battleship Csarevitch is to be taken from Toulon to Kronstadt as soon as the navigation is reopened; the armored cruiser Bayan, which was completed at La Seyne earlier in the year, has recently finished her trials. Both these ships will leave for the far east when ready. The Rostislav, battleship, has been completed in the Black sea. Four other battleships have been advanced during the past year—the Oslabia, the Kniaz Potemkin Tavritchesky, the Borodino, and the Alexander III. Two battleships were launched, the Orel and the Kniaz Suvaroff. There is also under construction the Slava. No less than seven other battleships

have been reported as commenced or about to be laid down, but nothing official has transpired in connection with these vessels. Nor does it appear that any more armored cruisers are in hand, although there are several protected cruisers in various stages of construction. Among the small craft five destroyers were completed during the past year and several torpedo boats. The following list contains the names of the battleships and armored cruiser completed or constructing:

Name and where built or building.	Displacement.	Date when begun, launched, or completed.
Battleships.		
Pobieda, St. Petersburg, (Baltic)	12,674	Completed 1902
Retvisan, Philadelphia	12,700	Completed 1902
Oslabia, St. Petersburg, (Admiralty	12,674	L. July 20, 1901
Orel, St. Petersburg, (Galney)	13,600	Completed 1902
Kniaz Suvaroff, St. Petersburg (Baltic)	13,600	L. Sept. 25, 1902
Slava, St. Petersburg, (Baltic)	13,600	Begun 1902
Kniaz Potemkin Tavritchesky, Nikolaieff	13,600	L. Oct. 9, 1900
Borodino, St. Petersburg, (Admiralty	13,600	L. Sept. 8, 1901
Alexander III., St. Petersburg (Baltic)	13,600	L. Aug. 3, 1901
Csarevitch, La Seyne	13,110	L. Feb. 23, 1901
Armored Cruiser.		
Bayan, La Seyne	7,800	Begun 1902

ITALY.

For Italy no battleships have been launched during the past year. Four are under construction, the names of which are given in the table below, and a sum sufficient to complete them has been voted by the Italian chamber. Three other battleships are projected. The armored cruiser Francesco Ferrucio was launched at Venice. The budget for this year, while making provision for the advancement of the above-named ships, also provides for a number of small craft, including three submarines. The battleships and armored cruiser in hand are given in the following list:

Name and where built or building.	Displacement.	Date when begun, launched, or completed
Battleships.		
Benedetto Brin, Castellamare	13,427	L. Sept., 1901
Regina Margherita, Spezia	13,427	L. March, 1901
Vittorio Emanuel, Castellamare	12,624	Begun 1901
Regina Elena, Spezia	12,624	Begun 1901
Duca d'Aosta, (A.), Castellamare	12,624	Begun 1900
Duca di Genova, (R.), Spezia	12,624	Begun 1902
Duca deglia Abruzzi, (C.), Venice	12,624	Begun 1902
Armored Cruiser.		
Francesco Ferrucio, Venice	12,624	L. April 23, 1902

THE UNITED STATES.

Of the thirteen battleships of the United States navy in hand or projected at the beginning of 1902, six have been completed and commissioned; the others have been considerably advanced. Two, the Connecticut and the Louisiana, are just beginning. The general naval board in 1901 recommended the construction of four additional battleships, and the submitted program of 1903-1904 contains two to make up this number, but as they have not yet been authorized, they do not appear in the annexed table. The ships in hand have been greatly delayed, owing to the failure of the contractors to deliver material. With regard to the armored cruisers, there are a large number in hand, but the two of last year's program are not yet ordered. Tenders have been called for, and the specifications provide for vessels of 14,500 tons, with a speed of not less than 21.5 knots, the cost not to exceed $4,650,000. No less than seven firms have bid for the building of these ships, most of the bids specifying that the ships shall be delivered in forty-two months. Messrs. Cramp, however, have offered to build one ship in thirty-nine months for $4,200,000, or two ships in thirty-six and thirty-nine months, respectively, for $4,000,000 each, and if they may build to their own design they will guarantee a speed of 22 knots.

Even when the program of ship building for 1903-1904 has been definitely settled it may not be until some time later that the construction of the vessels will be begun. The battleships and armored cruisers completed, in hand, or authorized, are given below:

Name and where built or building.	Displacement.	Date when begun, launched, or completed.
Battleships		
Maine, Philadelphia	12,300	Completed 1902
Illinois, Newport News	11,565	Completed 1902
Alabama, Philadelphia	11,505	Completed 1902
Wisconsin, San Francisco	11,565	Completed 1902
Missouri, Newport News	12,300	Begun 1900
Ohio, San Francisco	12,300	Begun 1899
Georgia, Bath	15,320	Begun 1900
New Jersey, Weymouth	15,320	Begun 1900
Virginia, Newport News	14,948	Begun 1900
Rhode Island, Weymouth	14,948	Begun 1900
Nebraska, Philadelphia	15,320	Begun 1900
Connecticut, Brooklyn	16,000	Begun 1902
Louisiana, Newport News	16,000	Begun 1902
Armored Cruisers.		
California, Union Iron Works	13,800	Begun 1900
West. Virginia, Newport News	13,800	Begun 1900
Pennsylvania, Seattle	13,800	Begun 1900
Colorado, Philadelphia	13,800	Begun 1900
Maryland, Newport News	13,800	Begun 1900
South Dakota, Union Iron Works	13,800	Begun 1900
Charleston, Newport News	9,700	Begun 1900
Milwaukee, Philadelphia	9,700	Begun 1900
St. Louis, Philadelphia	9,700	Begun 1901
Tennessee	14,500	Authorized 1902
Washington	14,500	Authorized 1902

THE RELIANCE, NEW DEFENDER.

Editor Marine Review:—On April 1 the new defender's crew, Scandinavians by birth, American by naturalization, are ordered to report on the tender Sunbeam. Each member of this necessarily large crew, from Christian Christensen, the first mate, to the humblest rope puller, will be comfortably housed, copiously fed, and generously paid.

The new defender, according to the nautical Solomons who have their headquarters in Bristol, is declared to be a remarkable boat, and promises to be phenominally successful as the cup's guardian. As an instance of the exaggerated reports current in this American boat's birthplace, her spread of canvas is said to be at least 18,000 ft.—duck of special quality, of a special weave—and her recently-completed main sail the biggest ever turned out.

It is a fallacy to suppose that a beautifully-bound book, which Mr. Lawson commissioned some one to write with a vitriolic pen, is the sole reminder of the defunct Independence. When racing the courses are over equilateral triangles—one leg expected to be to windward, one reaching, and running free over the third. When "close hauled," and also when "reaching," the Independence was a nonentity compared with the Constitution and the Columbia. The Boston boat's speed when "running free," however, was noticed by all, and made her a dangerous rival in a fair wind.

The New York Yacht Club has not published a book in response to the Bostonian's caustic remarks anent the former's behavior, but, on the contrary, Mr. Herreshoff has sincerely flattered Mr. Lawson by giving the defender some of the special features that enabled the Independence to make such good progress when "going before it." While the new boat is not of the "scow" type, and her bow is so fashioned as to eliminate all danger of pounding, when running she will rival the Independence, and yet make the other courses as speedily as the Columbia or the Constitution. The Independence has surely not lived her short life in vain if the eminent Bristol boat builder saw fit to duplicate some of her points.

The Columbia has been painted, the Constitution thoroughly overhauled, and when, as is expected, the new boat is launched during the middle of April, there will be three boats on this side of the Atlantic against which the Shamrock's chance of successful competition can safely be regarded as a forlorn hope. English marine journals devote much space to Shamrock III., but that the writers are unacquainted with the subject is shown by their declaring that said boat's sail area is going to be very small. For racing in August south of Long island, no sane yachtsman will let a boat compete that is not carrying all the canvas she can stagger under. Several authorities on matters nautical in general, and yachting in particular, even without the prejudice of national superiority, are confidentially predicting the American boat's success. But, as the Bristol wiseacres say when some of their statements are declared to be improbable—"Wait and see."

Bristol, R. I., Mar. 15, 1903.

TALK WITH PRESIDENT PENJE.

Concerning the contracts which the Seamen's union has entered into with the vessel men President Penje says:

"This is the first season in history when the owners of vessel property on the lakes have signed contracts with the Seamen's union and agreed to engage only members of the organization when they can be secured. We are going to show the owners that we mean to stand by these contracts and conduct our union as a business organization."

Mr. Penje is thirty-seven years old. He has been in the great lakes district since 1888. He was formerly a salt water sailor.

Trouble may be experienced on the Montreal wharves at the opening of navigation. The difficulty will be between the ship laborers and the contracting stevedores. The men are demanding ten hours as a day's work with 20 cents an hour for day and 30 cents an hour for night work and double price for Sunday.

MR. H A. DRURY TALKS ON LUBRICATION.

Mr. H. A. Drury of the marine oil department of the Standard Oil Co. spoke to the members of the Marine Engineers' Beneficial Association in Cleveland on Monday night on the subject of lubrication. It was rather more of an informal talk than anything else and Mr. Drury was well received by the engineers. It was his first opportunity of meeting them as a body since he came to the great lakes over a year ago to take charge of the organization of the marine oil department of the Standard company. Hitherto his work has been exclusively on the ocean. He said that the Standard Oil Co. had a most perfect organization on the ocean, having 160 foreign stations, and it was its desire to so perfect its system that a vessel anywhere in the world could be supplied with oil. On the great lakes the trade had been handled through the regular offices of the company—that is, there had been no special marine oil department on the lakes. In the future there would be a well-organized marine oil department, whose agents would handle marine oils exclusively, specializing precisely as the railroad and electrical oil departments of the Standard are specialized. A man who makes a specialty of a certain oil is likely to know more about it than one who handles all kinds of oil. Mr. Drury said that on the ocean the Standard had gone pretty thoroughly into what was best for marine engines, taking the testimony of engineers day by day, sifting, arranging, condensing and compiling it; not dealing in theory, but being guided by actual practice. In this the company had been greatly aided by experience gained in operating its own fleet of carriers and, like any other business enterprise, had paid well for the experience. The Standard Oil Co. takes nothing for granted. Of course, it has a policy, as have all successful enterprises, but its policy is simply the refinement of its actual experience. While the officials of the company are not themselves practical men, they have in their service the most thoroughly practical and scientific men they could find. The Standard found some time ago that the Vacuum Oil Co. had a greater percentage of ocean business than the Standard had. Competition between them was fierce for a time, sometimes the Vacuum getting the upper hand and sometimes the Standard; but eventually the Standard discovered by tests that the Vacuum was obtaining the ocean business solely upon the merits of its product. When that discovery was made the Standard perfected a working arrangement with the Vacuum company and is now handling the Vacuum marine engine oil. It derives its name from the method of its distillation and it is held to be the best oil for engines ever produced. Mr. Drury then entered into a discussion of the various kinds of crude petroleums found in the country and the character of the oils obtained from them. He held that it was better to pay a dollar a gallon for a good oil than to get a poor oil for nothing, for what is saved in oil is more than lost in fuel. He said that the Standard had been making elaborate tests of the use of lubricants and the corresponding consumption of fuel and had found that the saving of fuel varied anywhere from 7 to 65 per cent. He added that he would not dwell upon the saving of 65 per cent. because, undoubtedly, there were special circumstances involved, but that that amount had, nevertheless, been actually saved. What he endeavored to bring home to the engineers was the fact, susceptible of proof, that it paid to use upon the engines an oil specially made for them, even though it cost a little more per gallon, than to use an inferior kind of lubricant. The Standard desired to sell, not a dollar's worth of oil, but a dollar's worth of lubrication. He declared that there had been greater development in the commerce of the great lakes than anywhere else on earth, but that the steamers of the great lakes used less oil than any steamers he had ever heard of. He thought it would pay them to use more and believed the Vacuum marine engine oil, a light and highly refined oil, to be the best in the world. He added, however, that it would not work in unity with water but believed that it would pay lake vessel interests well to abandon the practice of using water in lieu of lubrication. He said, moreover, that it was the intention of the Standard to come into closer touch with the engineers and to obtain the benefit of their experiences. It is the policy of the Standard to get as closely as possible to the interests to which it caters.

BRITISH NAVAL ESTIMATES.

The British navy estimates for 1903-1904 provide for an expenditure of $179,184,205, an increase of $16,010,000, of which amount $11,180,000 will be devoted to ship building and repairs. The maintenance estimates provide for 127,100 officers and men, an increase of 4,600 officers and men. The total expenditure for ship building, repairs and maintenance is $89,103,600. The new construction includes three battleships, four armored cruisers, three protected cruisers to be used as scouts, fifteen torpedo boat destroyers, ten submarine torpedo boats, two coast guard cruisers, a river gun boat and an admiralty yacht. In an explanatory statement which accompanies the estimates Lord Selborne, first lord of the admiralty, announces the formation of a new squadron, to be known as the South Atlantic squadron. It will serve on the west coast of Africa and along the southeast coast of America with bases at Gibraltar and Sierra Leone. It is stated that the trials of oil fuel on British warships have been increasingly satisfactory.

BELLEVILLE WATER-TUBE BOILERS

NOW IN USE (FEBRUARY, 1903)

On Board Sea-going Vessels, NOT INCLUDING New Installations Building or Erecting.

French Navy	276,460	H. P.
English Royal Navy	849,300	"
Russian Imperial Navy	193,900	"
Japanese Imperial Navy	122,700	"
Austrian Imperial Navy	32,900	"
Italian Royal Navy	13,500	"
Chilian Navy	26,500	"
Argentine Navy	13,000	"
The "Messageries Maritimes" Company	87,600	"
Chemins de fer de l'Ouest: (The French Western Railway Co.) Steamships plying between Dieppe and Newhaven	18,500	"
Total Horse Power of Boilers in Use	1,634,360	

WORKS: Ateliers et Chantiers de l'Ermitage, at Saint-Denis (Seine), France.

TELEGRAPHIC ADDRESS: Belleville, Saint-Denis-Sur-Seine.

ITEMS OF GENERAL INTEREST.

The Dominion Line announces that arrangements have been made to run a regular service this season between Montreal and Avonmouth. The docks at Avonmouth have lately been improved at an expense of about $10,000,000.

The French naval program contemplates that France will possess by 1906 a fleet of twenty-eight battleships, fourteen coast-defense battlesnips, twenty-four armored cruisers, thirty-five protected cruisers, seventy-two destroyers, 210 ocean-going torpedo boats and sixty submarines.

Earnings of the Dominion Iron & Steel Co. of Canada for the month of January show a deficit of $37,067 after proportional interest charges and preferred stock dividend requirements. The December deficit was $8,142. The poor showing for January is attributed to severe winter weather preventing operations.

The nomination of Admiral Dewey has again been sent to the Senate, this time as "admiral of the navy." It appears that when he was elevated to this rank and his term of active service extended ten years an error crept into the text making him an "admiral in the navy." The new appointment is to remedy the error.

Proposals for building a life saving station at Racine, Wis., will be opened at the Washington office of the life saving service Mar. 27. Specifications, drawings, etc., may be had from the assistant inspector of the twelfth life saving district, Rand McNally building, Chicago, or from the Washington office of the service.

Of a total of 124,649,000 bu. of grain received by lake at Buffalo during 1902 the wheat aggregated 62,469,000 bu., corn, 22,491,000 bu.; oats, 15,893,000 bu.; rye, 3,717,000 bu.; barley, 8,970,000 bu., and flax seed, 11,109,000 bu. These figures are from the report of Junius S. Smith, grain weighmaster for the Merchants' Exchange of Buffalo.

The lake survey office at Detroit, in charge of Major Fiske and conducted under the direction of the army engineer corps, has been given for the coming year an appropriation of $150,000 for the expense of preparing, correcting, extending, printing and issuing charts and bulletins, and for investigating lake levels, with a view to their regulation. This is one of the items in the sundry civil appropriation bill.

It was recently reported that the Cartagena Terminal & Improvement Co. had contracted with James Rees & Sons of Pittsburg for two steamers and a floating dock for use on the Magdalena river. The company advises the Review that the report is incorrect and that no steamers are being built for the company. It is, however, considering the expediency of acquiring a floating dock for use on the Magdalena river.

A large steel tug, the Carbonero, 134x25x15 ft., with triple-expansion engines of 16, 24 and 40 in. cylinder diameters by 28 in. stroke, is to be sold at noon on the 21st inst, at the Atlantic Works, East Boston, Mass., by the United States marshal at that point. The tug has been thoroughly overhauled and is in very good condition. The sale is positive and the terms cash. The Carbonero is at the Atlantic Works where she may be seen at any time.

At the works of the Marine Construction & Dry Dock Co., Mariner's Harbor, New York, Mr. Wm. H. Langley's schooner yacht Montauk is undergoing general overhauling and repairs, including the rebuilding of her stern with an additional 8 ft. The work is being done from plans made by Sadler, Perkins & Field, naval architects and engineers, Maritime building, New York, and when completed will greatly add to the appearance of the vessel's hull, though the sail plan has not been altered materially.

The Liverpool Shipping Gazette says that it understands that the International Mercantile Marine Co. has decided not to build any more big vessels like the White Star Line steamers Cedric and Celtic until improved port facilities enable the company to exercise greater economy in working the vessels and render their construction a less risky financial undertaking. The Gazette also says that it believes the new White Star Line steamer Arabic, which is of 15,800 tons, will represent the limit to which the combination is prepared to go under the present circumstances.

The Coastwise Transportation Co. has been organized under the laws of New Jersey with a capital stock of $3,000,000, half common and half 6 per cent. cumulative preferred. It is to operate the boats owned by Capt. J. G. Crowley of Boston. The incorporators are C. Frank Houghton, New York; Arthur Seitz, Hoboken; J. G. Crowley, Boston; Homer Albers, Boston; James Bostwick, Hoboken; Edmund D. Vanderbilt, Hoboken, and William E. Parpart, Hoboken. It is understood that Thomas W. Lawson of Boston is to be president of the company and J. G. Crowley treasurer and general manager.

Mr. William Garrett recently had an article in the Iron Trade Review of Cleveland upon the subject, "The Problem of the Smaller Manufacturers of Rods and Merchant Bars." The question he discusses is whether there is a field for the small manufacturer as against the Steel Corporation with its immense resources. His contention is that there is a field and he proceeds to prove it. The article has now been lifted from the columns of the Iron Trade Review and issued in pamphlet form. It can doubtless be had by anyone who will write to the Garrett-Cromwell Engineering Co., New England building, Cleveland, for it.

The action of congress in striking out of the naval appropriation bill the 4 per cent. differential in favor of Pacific coast shipbuilders is a serious blow to Pacific ship building interests. Owing to the great distance from the principal manufacturing centers, the Pacific builders are handicapped in their competition with eastern builders. Of course it does not affect contracts under way but it will cause Pacific builders to exercise timidity in bidding upon naval work in the future. Mr. Robert Moran of the Moran Bros. Co., Seattle, says that 95 per cent. of ship parts are transported from the east and, of course, the freight bill is a heavy one.

The Bishop & Babcock Co. of Cleveland is equipping its machine shop for electric driving. The group system has been adopted and short lengths of line shafting throughout the shops are driven by Westinghouse induction motors. Seven or eight of the latter, ranging in size from 10 to 40 H. P. have been purchased and are now in operation, current being temporarily supplied from the plant of the Cleveland Twist Drill Co., which is also equipped with Westinghouse apparatus. The Bishop & Babcock Co., however, is installing a power plant of its own and has recently purchased a 175-kilowatt, two-phase, Westinghouse, engine-type alternator, with switchboard complete. Geo. S. Rider & Co. are the engineers for the plant.

It is announced from Chicago that the strike of ship carpenters and calkers at the works of the Ship Owners' Dry Dock Co. is at an end.

Extraordinary low rates to Minnesota, North and South Dakota, Manitoba and the northwest by way of the Nickel Plate road, March 17, 24, 31 and April 7 and 14, 1903. See nearest agent or address E. A. Akers, C. P. & T. A., Cleveland Ohio.

21, Apr. 13.

"KEARSARGE"
ASBESTO-METALLIC
PACKINGS

Made from pure Asbestos yarn and fine brass wire, firmly woven together

GASKETS
will not blow out, will hold against any steam pressure, will stand highest temperature.

Used exclusively on the hand holes of Babcock & Wilcox and other water-tube boilers.

SHEET PACKING
The most reliable flat packing on the market for all conditions of steam service

PISTON ROD PACKING
For high speed, high temperature, high pressure, with or without wire interwoven.

FLANGE JOINT GASKETS
More reliable than rubber or metallic and cost much less. Will not blow out. Unaffected by high temperature. Without expansion or contraction. Works perfectly whether conditions are favorable or unfavorable.

Write for samples, prices and full information.

NEW YORK MILWAUKEE CHICAGO ST. LOUIS BOSTON
H.W. JOHNS-MANVILLE CO 100 WILLIAM ST. NEW YORK
PHILADELPHIA CLEVELAND PITTSBURG NEW ORLEANS LONDON

United Marine Mfg. & Supply Co.,
MANUFACTURERS OF AND DEALERS IN
ELECTRICAL MATERIAL
FOR SHIPS AND FORTIFICATIONS.
ALBERT C. JAHL, General Manager,
100 William St., New York, U. S. A.

DUTIES OF THE STEAMBOAT STEWARD.

The following article upon the duties of a steward, written from the inside, will probably be very interesting reading. It is the work of Mr. Charles C. Schantz and relates mainly, of course, to the duties of stewards in large passenger steamboat lines, such as the Detroit & Cleveland Navigation Co. and the Detroit & Buffalo Steamboat Co., with which Mr. Schantz is connected.

In former years, say ten seasons ago, steamer stewards were as plentiful as southern watermelons in the month of August. In those days the steamboat steward did his own buying, hired his own help, and thought himself almost as important as the captain of the ship. Time has changed things considerably. The general manager nowadays hires a man whose title is chief steward, and who is better known to most people as purchasing agent or port steward. Some assume the lengthy title of chief of the commissary department. His office and storeroom are located on shore. From there he hires, purchases and directs the duties and labor pertaining to all his departments. He is held responsible for anything and everything that comes under his supervision. The storeroom is filled with all commodities that are used on the steamer in all departments, and is run on the same order as any wholesale house. The watchword is "economy, discipline and cleanliness."

The chief steward superintends the laying up and fitting out of steamers in the spring and fall, which alone is quite a task. People who have never visited a steamboat in its winter quarters would be surprised to learn how everything is taken up and placed away in square piles in the main cabin of the boat, covered with canvas, and pinned so as to be free from dust or dirt during the three months of "winter vacation." Just before the steamer makes her last trip of the season men are put to work taking up tacks from the cabin and stateroom carpets. When the boat comes into port on her last trip carpets are rolled up and sent to a cleaning establishment to be renovated. Then comes the Pullman blankets, placed away with moth-balls; linen packed up in canvas bags; pictures are taken down in staterooms and parlors, and mirrors, hat-racks, water receptacles, stateroom notices, etc., removed. Each piece is wrapped separately and placed in lockers, safe from carpenters and painters. After this, the mattresses, life preservers and pillows are taken out on deck and thoroughly beaten clean; together with the iron springs they are piled high in the main cabin. Carpets about this time arrive from the cleaners, and, with the linings, are made into a neat square pile. The electric light globes (about 1,800 on one of the large steamers) are taken down, wrapped in tissue paper, and placed away in barrels. Electric fixtures are covered with muslin caps. Then come the rail and furniture covers. When every article is taken down and out of the cabin and staterooms, neatly packed in the main cabin in square piles, they receive their "canvas overcoat" for the winter.

After all this is accomplished, the scrubbers, with pails and sponges, clean and wash down every particle of woodwork. When they finish the cabin and staterooms, open house is kept for three weeks to receive the carpenters, painters and decorators. The kitchen, dining-room and buffet, in fact, every quarter of the steamboat, receives the same attention; so when she comes out in the spring the steamer looks like an Easter Sunday millinery establishment.

Today it is hard to find a lake steward who is thoroughly posted on the ins and outs, duties, labor and worry connected with a steward's position. Under his management—and he is held responsible for the cleanliness thereof and the care of every article pertaining thereto—are the kitchen, pantry, pastry and storeroom, dining-room, buffet, social hall, baggage department, main saloon or cabin, crew's sleeping apartments and closets, staterooms, parlors, bathrooms, washrooms, closets, lockers, barber shop, ice boxes, after cabin for second-class passengers, three mess rooms and the smoking or observation parlor. One can therefore readily observe that a steward on a floating hotel has his hands full of work; to see that everything pertaining to his department is kept in first-class condition, each quarter immaculate; to stand the daily inspection by the chief steward or by the officers of the company. Passengers or visitors who step aboard a lake liner, who look at the beds covered with snowy white linen, the white woodwork spotless; the carpets, rugs, curtains, blankets, windows, furniture, free from dust or dirt; the highly polished brass shining as bright as the sun, never realize the enormous amount of labor connected with one of these floating palaces.

There are plenty of hotel stewards to be found who are willing to accept a position of this kind. Some of the best have been tried and found wanting, on account of lack of steamboat experience. Today a steward of a first-class passenger vessel commands a salary from $100 to $200 per month (according to size of steamer) for a ten month's season. Inside hotel stewards who have had years of experience in hotel stewarding and know something about steamboating would do well to accept a position on a passenger boat as assistant steward for a season so as to become familiar with the duties and requirements of a fresh-water steward. He will receive a salary of between $65 and $90 per month if he is quick and active. The following season, no doubt, would find him ripe for a stewardship, provided he kept his eyes open and put the pointers he gained into his head.

There are two kinds of marine stewards—the freight and passenger. On a freight boat a cook is hired to please the captain and his crew. He is called a steward by them. He does not need to be a first-class cook to hold his job. Good, plain, substantial home food cooking is all that is required of him. I don't mean by this that there are no good "chefs" on lake liners. Some companies hire none but the best. But the passenger boat steward, who is an officer as well, is carefully selected each season by the chief steward from a score of applicants. He has been a "chef," passed through long hours of daily toil in front of his range, and with careful study acquired the position and title of steward. He understands thoroughly everything pertaining to the culinary department in detail. Educated in the kitchen from a panwasher up, promoted from time to time as he learns the art and mysteries of good things that are served to the public, until he is competent to assume the position as "chef," then steward. He is surrounded by a small army of select operators.

Each department has its head and managed by the following assistants of the steward: The "chef" is king in the kitchen, pantry and pastry rooms. The head waiter rules over the waiters and has charge of the dining-room. The baggagemaster looks after the porters, mess boys and scrubbers. The day watchman has his troubles with the cabin cleaners and linemen. The housekeeper looks after the cabinmaids. The night patrolman whips the bellboys into line. The assistant steward keeps his eyes open over all departments, so the poor steward, who never sleeps, works and worries along to bring about the desired results. The hotel steward never gave the marine passenger steward credit for being what his title calls for. Some of them still look upon him as only a common ordinary cook with a gifted title. This would have been taken seriously years ago, but today the floating palaces on the great lakes require a man who has the brains and experience of any hotel steward in the country—so take off your hats to your equal, "Mr. Landlubber!" Give the sea dog his just due! He does twice as much work and gets the least pay.

Mr. George Dunlap, who will be known to many of the older men in the lake trade, died at his home in Detroit this week. He was in his early days the secretary of the late Eber B. Ward and sailed also on one of Mr. Ward's steamers. Latterly he had had charge of the real estate holdings of the David Whitney estate. He was a man of excellent understanding.

Homeseekers' excursions by way of the Nickel Plate road. Ask nearest agent about them or address E. A. Akers, C. P. & T. A., Cleveland, Ohio.

"Seaboard Steel Castings"

A Guarantee of Quality.

Open Hearth Steel Castings of the Highest Grade for Locomotive, General Machinery and Shipbuilding Work.

Subject to U. S. Government, Lloyds, Railroad and Other Highest Requirements.

Seaboard Steel Casting Co.,
Chester, Pa.

If you want to KNOW WHY

Dearing Water Tube Boilers are best???

Drop us a postal

Dearing Water Tube Boiler Company
288 to 296 Fort St., West. DETROIT, MICH.

TRADE NOTES.

Mr. Guy W. Buxton, who has been for some time connected with the New York office of the H. W. Johns-Manville Co., has been recently appointed auditor of that company, the branches of which are located in Milwaukee, Chicago, St. Louis, Pittsburg, Cleveland, New Orleans, Philadelphia and Boston.

"Smokeless Combustion" is the title of a very neat, well-illustrated pamphlet, dealing with the Duluth stoker and just put out by Mr. W. O. Root, manager of the Duluth Stoker Co., Duluth, Minn. This is the stoker that has been in use for a long time past on several of the largest steam freighters of the great lakes and which is now being installed on ten new steamers in lake yards. Of course the stoker is built also for stationary steam plants. The pamphlet contains a number of testimonials and the tenor of all of them is reduced cost of fuel.

The Chase Machine Co. of Cleveland, engineers and machinists, has just issued a catalogue devoted to its deck machinery for handling vessels, hoisting engines, decking and hauling engines, steam capstans, deck hoisters, automatic steam towing machines and marine and stationary gas and gasoline engines. The catalogue is well illustrated throughout with photographs and may be had for the asking. The output of this company has increased over 450 per cent. in the last four years. This is certainly evidence of the quality of the company's work.

Big Ben, the celebrated clock of London, which regulates the time of a large portion of the British Empire, is having the dials on each of its four sides illuminated with 60-candle-power Nernst lamps. The clock was formerly lighted by gas jets, twenty-four being used to each dial, and on each night of the 365 days of the year a man had to climb up and light each of these ninety-six jets. Two men are still required to wind the clock, spending three afternoons of each week for the purpose. Big Ben is considered reliability itself, and the average Londoner would as soon think of the world ceasing to revolve on its axis as to imagine the hands of this clock failing to move around its dials unceasingly night and day, except for a short time once in fifteen years when the clock has a short rest in order that it may receive a thorough cleaning.

"Can a Small Tool Room Compete With a Big Factory?" is a question which is asked in a leaflet by the Pratt & Whitney Co. of Hartford, Conn. The leaflet contains a well-executed wash drawing of the new small tool department of the Pratt & Whitney Co. Concerning it the company says: "The plant is equipped throughout in the most perfect manner and we wish to call attention to the fact that the individual tool room cannot compete with such facilities. You do not make your own drill presses and for the same reason should not make your own taps, dies, milling cutters and reamers. Can a tool room, with from three to twenty men, using standard tools, hope to compete with a plant equipped with the latest automatic devices, turning out daily the yearly product of the largest tool room. It is a day against a year—the old story of the stage coach against the railroad. A figure giving us a reasonable profit will be a loss to you."

Iron workers at the Bertram Engine Works Co.'s ship yard, Toronto, took occasion last week, in a suitable address, to express their regret that Mr. A. Angstrom, late managing director of the Bertram company, had severed his connections with that company, which he did in order to accept the position of general manager of the recently organized Canadian Ship Building Co., which company, it is understood, will operate on a large scale at some point on the lakes above the Welland canal. The iron workers also presented Mr. Angstrom with a gold headed cane, suitably inscribed, as a slight memento of pleasant relations while the Bertram yards were under his management. Some of those represented in this presentation had served under Mr. Angstrom's management for nearly ten years. They heartily joined in expressing their respect and esteem for their late manager and were sanguine in their wishes for his continued success in the ship building industry. Mr. Angstrom thanked the men in an apt and suitable manner, expressing earnestly his appreciation of their gift.

Some fifty-seven or fifty-eight steamers laid up in Milwaukee are getting fit-out from the Sheriffs Mfg. Co. At the works of the Sheriffs company extensive engine repairs and improvements are being made on the steamers Siberia, Massachusetts and Christie. In December last ten propeller wheels were shipped from these works and in January twelve, the list including six to New Orleans, five to Chicago, one to Chattanooga, one to Louisville, four to Manitowoc and one each to Ludington, Mich., Grand Rapids, Mich., Jeanereth, La., Burrick, La., and Norfolk, Va. A Sheriffs steam steerer among the shipments was for a tug at New Orleans.

The annual statement of the Niles-Bement-Pond Co. and constituent companies (machine tool combination) for the year ended Dec. 31, 1902, shows net earnings of $1,627,965, as against $1,468,570 for the preceding year.

PITTSBURGH WHITE METAL CO.

MANUFACTURERS OF THE BEST

BABBITT and ANTI-FRICTION

Metals

Known for any Purpose.

Made from the Best Materials.

Price and Quality Guaranteed and Always Consistent with the Market.

PITTSBURGH, - PA.

PNEUMATIC TOOLS

FOR ALL PURPOSES SIMPLEST AND BEST

RAILWAY APPLIANCES COMPANY

CONSOLIDATED WITH THE Q-C COMPANY

GENERAL OFFICES OLD COLONY BUILDING CHICAGO.

NEW YORK OFFICES 114 LIBERTY ST.

Steamer for Sale.

Steamer Fanchon for sale. 47 ft. over all, 12 ft. beam, 4 ft. 5 in. draught; full cabin; hull thoroughly rebuilt last fall. Engine 8x8. Boiler 6 ft. long and 54 in. diameter with new flues put in last fall; allowed 125 lbs. of steam pressure. Speed 11 miles an hour. Reason for selling, no use for the boat. H. A. Blume, Duluth, Minn. Apr. 9.

U. S. Marshal's Sale.

Office of the U. S. Marshal, Boston, Mass., Mar. 9, 1903.

Pursuant to a warrant for the sale of the steam tug Carbonero, her engines, boilers, apparel and furniture, issued this day by the honorable district court of the United States for this district, I shall sell at public auction, to the highest bidder, on Saturday, Mar. 21, 1903, at 12 o'clock, noon, the said steam tug and appurtenances. The sale will take place at the Atlantic Works, East Boston, where said steam tug can be seen and examined any day prior to the sale. Sale positive. Terms cash; $500 deposit at time and place of sale. CHARLES K. DARLING, U. S. Marshal. Mar. 19.

A. J. MORSE & SON.

DIVING APPARATUS

140 CONGRESS ST. BOSTON.

Towing Outfit for Sale.

For Sale—Complete towing outfit, including tug, scow, sand pump, etc. All in good order; reasonable price. Address Butler Bros, St. Paul, Minn. Apr. 2.

Salesman Wanted.

An article for every boat. Not new. Saves money while improving service. Large profits. Address Box 40, Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland O. tf

U. S. Engineer Office, Grand Rapids, Mich., March 2, 1903. Sealed proposals for repair of south pier at Portage Lake, Mich., and extension and repair of piers at Frankfort, Mich., will be received here until 3 p. m., April 1, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt., Engrs. Mar. 26.

U. S. Engineer Office, Galveston, Tex., Feb. 23, 1903. Sealed bids, in triplicate, for improving Aransas Pass, Tex., by removing part of old jetty, will be received until 2 p. m., March 25, 1903, and then publicly opened. For information apply to C. S. RICHE, Capt., Engrs. Mar. 19.

Treasury Department, U. S. Life-Saving Service, Washington, D. C., Mar. 12, 1903 Sealed proposals will be received at this office until 2 o'clock p. m. of Friday, Mar, 27, 1903, and then publicly opened, for the construction of a life-saving station and wharf at Racine, Wisconsin. Specifications and drawings, forms of proposal, etc., can be obtained upon application to the Superintendents of Construction of Life-Saving Stations, 17 State Street, New York City; to the Assistant Inspector, 12th Life-Saving District, Room 543, Rand-McNally Building, Chicago, Illinois; or to this office. S. I. KIMBALL, General Superintendent. Mar 19.

U. S. Engineer Office, Grand Rapids, Mich., Mar. 12, 1903. Sealed proposals for extension of west breakwater at Petoskey, Mich., will be received here until 3 p m., April 11, 1903, and then publicly opened. Information furnished on application. CHARLES KELLER, Capt. Engrs. Apr. 2.

U. S. Engineer Office, Duluth, Minn., Mar. 12, 1903. Sealed proposals for furnishing 6,000 barrels Portland cement for concrete superstructure to breakwater at Marquette, Mich., will be received here until noon Apr, 11, 1903, and then publicly opened. Information on application. D. D. GAILLARD, Capt., Engrs, Apr. 9.

ANTONIO C. PESSANO,
President and General Manager.

GEORGE H. RUSSEL,
Vice President.

JOHN R. RUSSEL,
Secretary-Treasurer.

GREAT LAKES ENGINEERING WORKS

DETROIT, MICH.

Steel Ship Builders—

We have under construction a complete Ship Building Plant, modern in every detail and capable of handling the LARGEST SHIPS which the trade of the Great Lakes will require; also

Floating Dock—

A Floating Dock of all steel construction and equipped with the best pumping machinery and appurtenances, and with a capacity for Docking the largest Boats afloat or which may be built.

Marine Engines—

We build High Grade Engines for Lake and Ocean Service.

Propeller Wheels—

Improved designs of high efficiency, made of Semi Steel, either whole or sectional.

Hydro Carbon System—

We are the sole owners of the rights for applying this system to the Steamers of the Great Lakes. If your boilers are using too much coal, if you are short of steaming capacity, if you want to convert the objectionable black smoke into money, the HYDRO CARBON SYSTEM should receive your attention, as it successfully and economically handles each of the above cases.

Hydraulic Dredges—

We build all sizes for any service.

Marine Repairs—

and Supplies of all kinds, and Heavy Forgings.

There's Only One "American"

The only genuine American Asbesto-Metallic Packing comes in boxes like the one shown here. That's the way to tell it in buying it. It's easy enough to tell it in using it, but sometimes that's too late.

American Asbesto - Metallic, like everything truly "American," is made for work under high pressure.

You know how it's built—rubber core of our famous **I** shape non-vulcanizing compound—that's for resilience. Asbestos over this to keep it from burning. Flax and soft wire over all to give it long life and happiness to the user.

We make other kinds of packings, too—every good kind. We are headquarters for everything in packing.

Get our catalog and prices.

AMERICAN STEAM PACKING COMPANY

60 Federal Street, Boston, Mass.
14 North Canal Street, Chicago, Ill.
712 Post Street, Seattle, Wash.
35 Dey Street, New York.
292 Mission Street, San Francisco.
28 Victoria St., London, S. W., Eng.

The Cleveland Trust Company

Pays four per cent. interest on savings deposits.

Acts as Executor, Administrator and Trustee under wills; Registrar and Transfer Agent of Capital Stock of Corporations; Trustee under bond issues of Municipalities or Corporations.

CAPITAL and SURPLUS - $2,800,000.00
DEPOSITS - - - $15,000,000.00

NO 1 EUCLID AVE · NO 121 EUCLID AVE

Commenced Business June 3, 1901.

4 Per Cent. on Savings.

THE FEDERAL TRUST CO. CLEVELAND.

Superior Street. Corner Water.

CAPITAL $1,500,000.

Surplus and Undivided Profits (Earned) $152.000.

Pays Interest on Check Accounts.
Acts in any Trust Capacity.

OFFICERS:

JOSEPH C. GILCHRIST, President.
FRANK W. HART, First Vice-President.
FRANK M. OSBORNE, Second Vice-President.
GEORGE F. CLEWELL, Secretary-Treasurer.
GEORGE J. BAILEY, Assistant Secretary-Treasurer.

EXECUTIVE COMMITTEE.

JOSEPH, C. GILCHRIST, FRANK W. HART, FRANK M. OSBORNE, WILLIAM H. LAMPRECHT, HARVEY D. GOULDER, CHARLES W. BAINE.

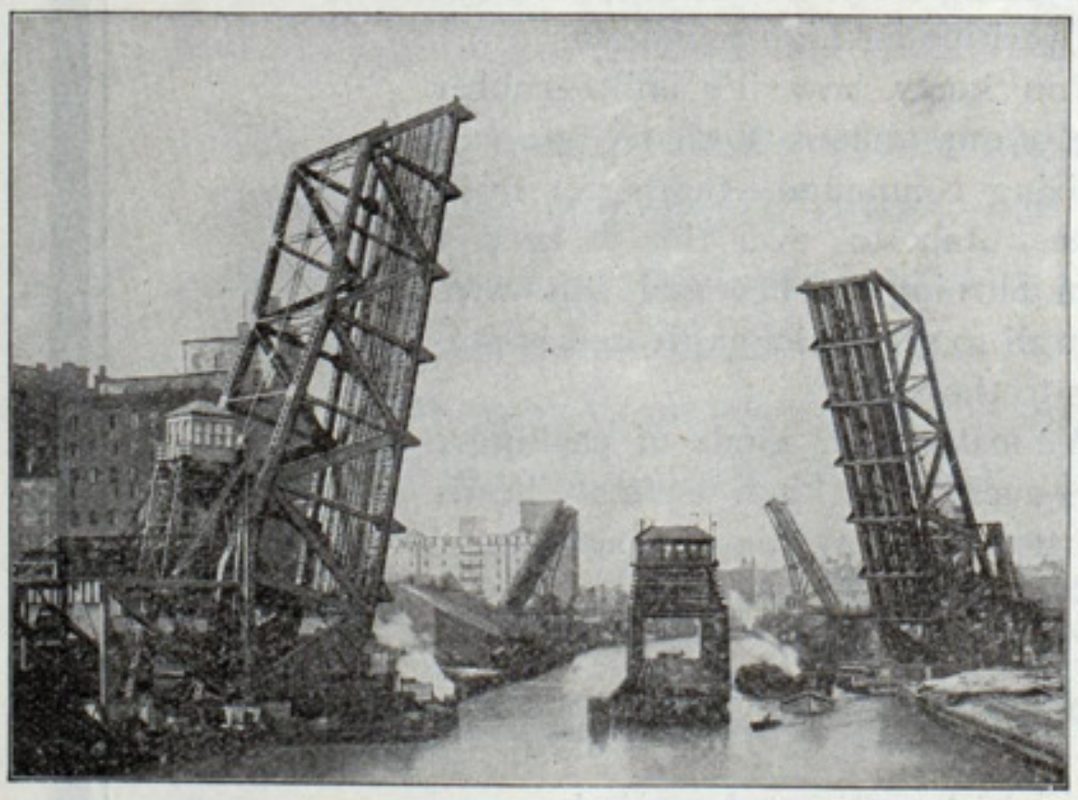
DIRECTORS.

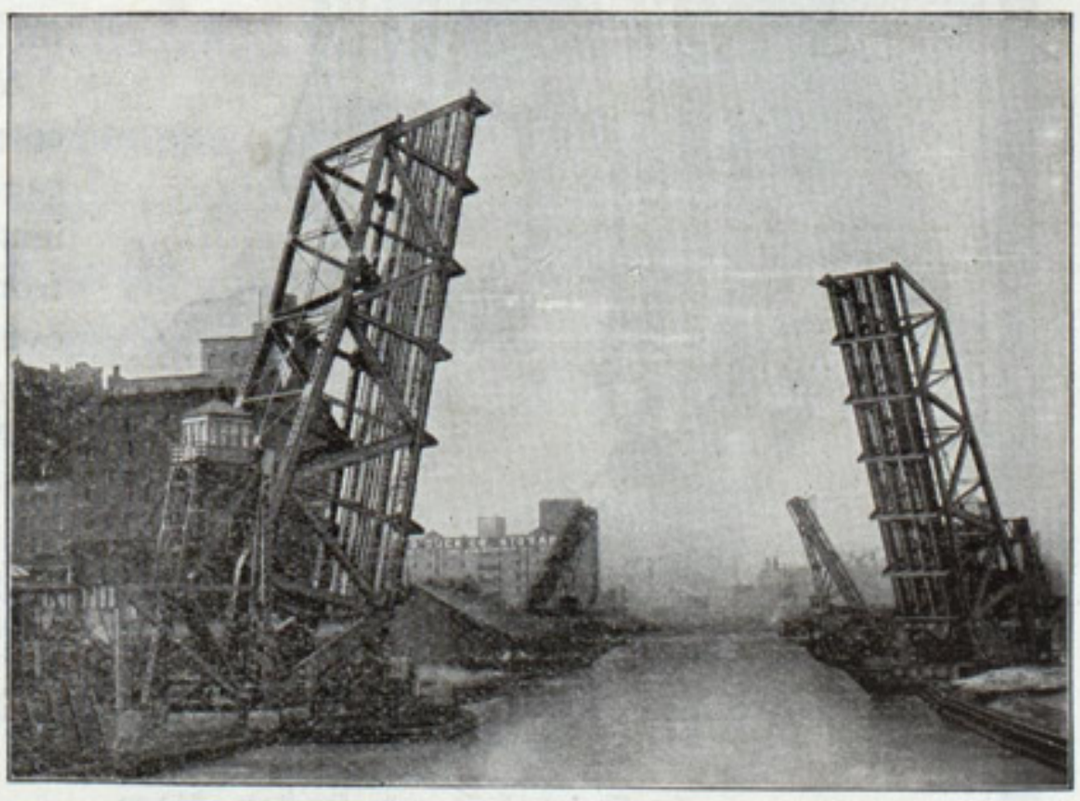
JOSEPH C. GILCHRIST, Banker and Vessel Owner.
FRANK W. HART, Hart & Co., Wholesale Millinery.
FRANK M. OSBORNE, President, Youghiogheny & Ohio Coal Co.
HARVEY D GOULDER, Goulder, Holding & Masten, Att'ys.-at-Law.
WILLIAM H. LAMPRECHT, The Lamprecht Bros. Co., Bankers.
LUCIEN B. HALL, Benton Myers & Co., Wholesale Druggists.
CHARLES W. BAINE, Beaver Dam Coal Co.
SOL M. HEXTER, S. M. Hexter & Co., Importers.
Fred T. POMEROY, Treas. and Gen. Mgr. Cleveland, Elyria & Western Ry.
WILLIAM H. HUNT, Gen. Mgr. The Cleveland Hydraulic Press Brick Co.
WM. O. MATHEWS, Lamson & Mathews, Attorneys-at-law.

POSTAGE and PRINTING WASTED

Tons of it fail to reach the right people.
Not so when lists are selected from such reliable publications as the
Blue Book of American Shipping.
A directory of everything pertaining to ships. List of Ship Owners, Ship Masters, Ship Builders, Naval Architects, Marine Engineers.
The Marine Review Pub. Co., Cleveland, Ohio.

TEXT BOOK OF
NAVAL ARCHITECTURE,
BY J. J. WELCH.
$1.50.
MARINE REVIEW PUB. CO., - - - - CLEVELAND.



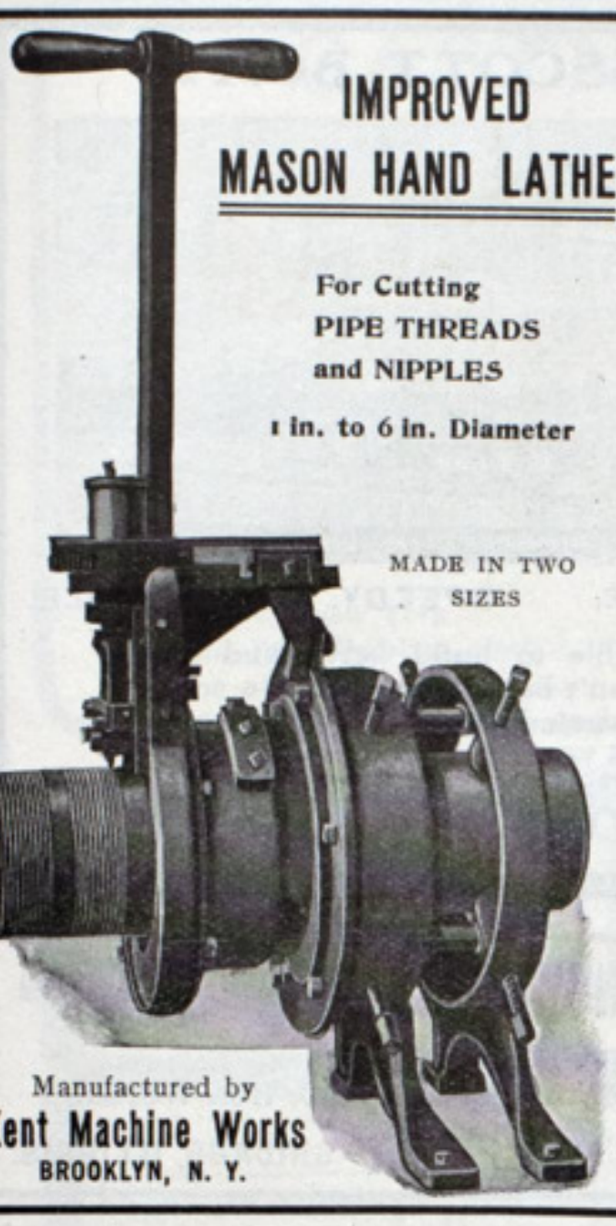


TWO VIEWS OF
THE SCHERZER ROLLING LIFT BRIDGE

across the Chicago River at entrance to the Grand Central Station, Chicago, before and after the removal of the old center pier swing bridge, showing the obstruction to navigation caused by the center pier and protection pier of the old swing bridge, and the wide and unobstructed channel given by the new Scherzer Rolling Lift Bridge.

Preliminary Sketches and estimates of cost furnished without charge to responsible parties in any part of the world, upon request accompanied by the necessary data.

THE SCHERZER ROLLING LIFT BRIDGE CO., Main Offices: 1616 Monadnock Block, CHICAGO, U.S.A.



IMPROVED
MASON HAND LATHE

For Cutting
PIPE THREADS
and NIPPLES

1 in. to 6 in. Diameter

MADE IN TWO SIZES

Manufactured by
Kent Machine Works
BROOKLYN, N. Y.

A full stock of the new colored army charts, as well as all the latest hydrographic office charts and sailing directions, is kept on hand at all times by the

MARINE REVIEW PUB. CO.,
39-41 WADE BUILDING, CLEVELAND.

Nothing but the latest charts, corrected up to date are sold.

ORAM FIX. ESTABLISHED 1860. J. W. FIX.

S. FIX'S SONS,

Successors to S. FIX & SON,

Steam Flue Welding Works

Our Work Stands Government Test.
Our Welds are Perfectly Smooth.
Write us for Prices.

COR. LEONARD AND WINTER STS. Cleveland, O.

ALFRED B. SANDS & SON

MARINE PLUMBERS
AND MANUFACTURERS OF
Marine Plumbing Specialties

Marine Water Closet for either above or below water line.

Folding Lavatories, Ventilators, Pumps, Tanks, &c., &c.

134 BEEKMAN ST., New York.

CHARTS
OF THE
St. Lawrence River
AND
THE COAST.

We can supply charts sufficient to take a vessel from the lakes to the Atlantic ocean, and from the Gulf of St. Lawrence to the coast of Florida.

A complete set of charts from

Lake Ontario to the Atlantic Ocean.

Thirty-six in all, (including one general chart of Lake Ontario, harbor chart of Quebec, charts of the Gulf of St. Lawrence and the coast of Nova Scotia) will be sent, charges prepaid, to any address in the United States or Canada for $17.

Charts of the United States coast on the Atlantic, from Nova Scotia down and including all of Florida, also general charts of all the United States coast, northern part of South America, as well as European coast and northern part of Africa, 21 charts in all, sent to any address in United States or Canada, for $11.50, charges prepaid.

Marine Review Pub. Co.
39-41 Wade Bldg.,
Cleveland, O.

DOWNING METALLIC PACKING
Sold Under 5 Years' Guarantee
WRITE FOR CATALOGUE
THE N. L. HAYDEN MFG. CO.
COLUMBUS, OHIO

No Satisfaction Short of Perfection

is the Principle underlying the Construction of the.....

SMITH PREMIER Typewriter

That is why Practical Improvements are first seen on the SMITH PREMIER. It is an up-with-the-times machine. .. ..

:: ::: Illustrated Catalogue Free ::: :::

The Smith Premier Typewriter Co.

158 Prospect St., Cleveland, O.

MACHINERY New and Second Hand ENGINES, BOILERS, MACHINE TOOLS, CONTRACTORS' MACHINERY

Geo. H. BOWLER & CO.
507-508 WILLIAMSON BUILDING. CLEVELAND, OHIO
Warehouses 20-22 Frankfort St. 59-61 So. Water Street. Cleveland Terminal & Valley Railway.

Photographs of Marine Scenes on the Great Lakes.

Negative size of the following Photographs is 7x9 inches. Sent to any address, postpaid at 75 cents each.

ASHTABULA, OHIO.
- Harbor Entrance.
- L. S. & M. S. Ry. Ore Docks.
- L. S. & M. S. Ry. Ore Docks—unloading ore.
- L. S. & M. S. Ry. Ore Docks—ore on docks.
- Car Dumping Machine, two views.
- Fueling Lighter with Clam Shell Hoist.

BUFFALO, N. Y.
- Harbor Entrance.
- City Ship Canal.
- Great Northern Elevator and Shipping.
- Great Northern Elevator—unloading grain.
- River and Elevators.
- River and Elevators, foot of Michigan St.
- River and Elevators, foot of Main St.
- C. & B. Line Freight Sheds.
- Northern Steamship Co.'s Winter Quarters.
- "An Old Timer" at C. T. T. Elevator.
- Lackawanna Coal Chutes, two views.
- Lackawanna Ore Docks—unloading ore.
- Lackawanna Ore Docks—unloading ore and loading coal.
- Unloading Ore from Whaleback, two views.
- Unloading Wheat into Elevators, two views.

CHICAGO, ILL.
- Chicago River Elevators.
- Lake Front, from Illinois Central Station.
- Illinois Steel Works and Harbor Entrance, South Chicago.

CLEVELAND, O.
- Cleveland Harbor from Lake View Park.
- American Steel & Wire Co.'s Plant.
- Ellsworth Coal Chutes-Dumping Car, two views
- Cleveland & Pittsburg Ore Docks, two views.
- Ore Docks and Harbor, two views.
- Unloading Ore, two views.
- Globe Iron Works Ship Yard.
- Globe Iron Works Ship Yard, Laying Keel of No. 400.

CONNEAUT, O.
- Harbor Entrance.
- Unloading Ore—Brown Conveying Hoists, two views.
- Unloading Ore—Clam Shell Plant.
- Car Dumping Plant, two views.

DETROIT, MICH.
- Winter in Detroit River.
- Car Ferry turning in ice—two views.
- "Michigan Central" entering slip.

DULUTH, MINN.
- The Harbor.
- The Bluffs.
- "Last Trip From Duluth."

ERIE, PA.
- Anchor Line Docks and Pennsylvania R. R. Co.'s Ore and Coal Docks.
- Pennsylvania E. R. Coal Trestle.
- Pennsylvania R. R. Co.'s Docks. Unloading Ore
- Hanna's Ore Plant.
- Coal Trestle and Car Dumping Plant.

OSWEGO, N. Y.
- Coal and Ore Docks.

ST. CLAIR FLATS.
- Str. Tashmoo Entering Ship Canal.
- A Freighter Leaving Ship Canal.
- Lake Vessels Old and New.
- Nightfall on the River.
- A Lumber Tow.

SAULT STE. MARIE, MICH.
- General View of Locks from Offices.
- Poe Lock, from below, closed.
- Poe Lock, from below, open.
- Poe Lock, from above.
- Poe Lock, with Whaleback.
- Weitzel Lock, from above.
- Weitzel Lock, from below.
- Str. North-Land Passing Locks, two views.
- Upper Entrance to Lock Canal.
- Gate Mechanism.
- Interior of Power House.
- Canadian Lock from Upper End.
- Canadian Lock from Lower End.
- The Rapids, looking up.
- The Rapids, looking across.
- Indians fishing in the rapids.

PANORAMIC VIEWS.—7x17 inches at $1.75 each.
- Lackawanna Ore Docks—Unloading ore.
- American Steel & Wire Co.'s Plant, Cleveland.
- Ore Docks and Harbor, Cleveland.
- Ore Docks, Cleveland.
- Water Front, Detroit, from Windsor.
- Coal and Ore Docks at Oswego.

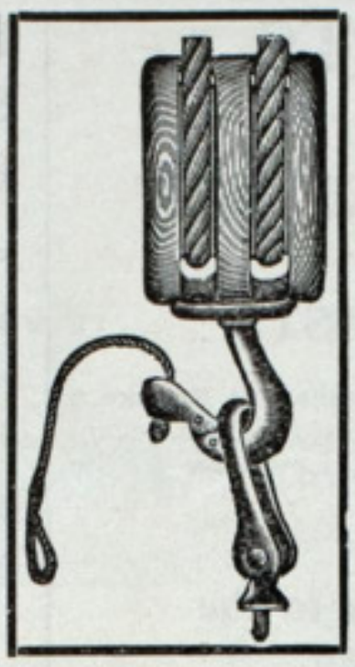
Address: MARINE REVIEW PUB. CO., 39-41 Wade Bldg., Cleveland. Ohio

Standard Automatic Releasing Device.

The Falls are so rove that both ends of the boat detach, irrespective of which end strikes the water first

Will release a boat immediately in the roughest sea or under speed and can be hooked on without delay or injury to the hands of men hooking it on.

Standard Automatic Releasing Hook Co..
New Cheesebrough Bldg.
17 State St., New York.



Fogg's Resilent Felt Matresses and Cushions.

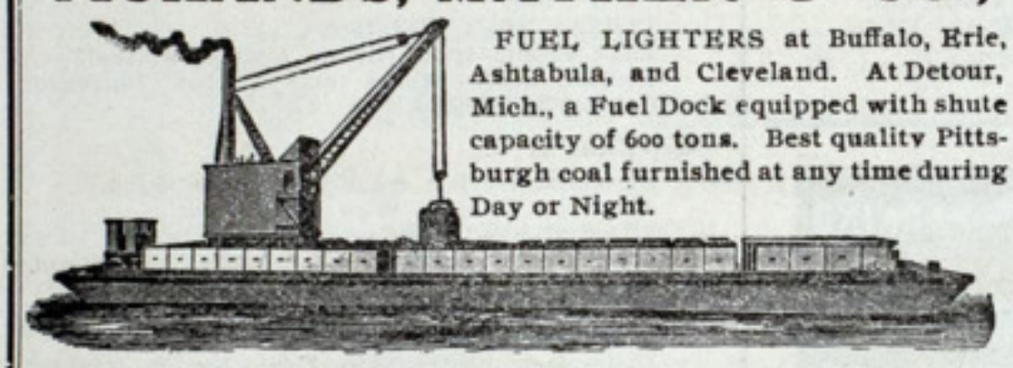
Manufactured By.

M. W. FOGG,

202 Front St. N. Y.

Send for Illustrated Catalogue.

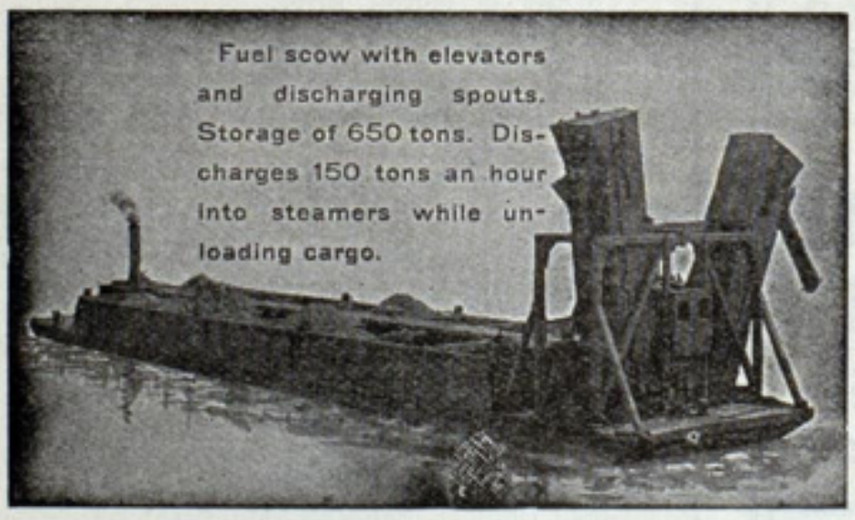
PICKANDS, MATHER & CO.,



FUEL LIGHTERS at Buffalo, Erie, Ashtabula, and Cleveland. At Detour, Mich., a Fuel Dock equipped with shute capacity of 600 tons. Best quality Pittsburgh coal furnished at any time during Day or Night.

Western Reserve Building, CLEVELAND, O.

Steamboat Fuel at Ashtabula. Large Supplies of best Quality.



LIGHTER Carrying Different Grades at all Times.

M. A. HANNA & CO. Miners and Shippers, Main Office Perry-Payne Bdg. Clevl d.

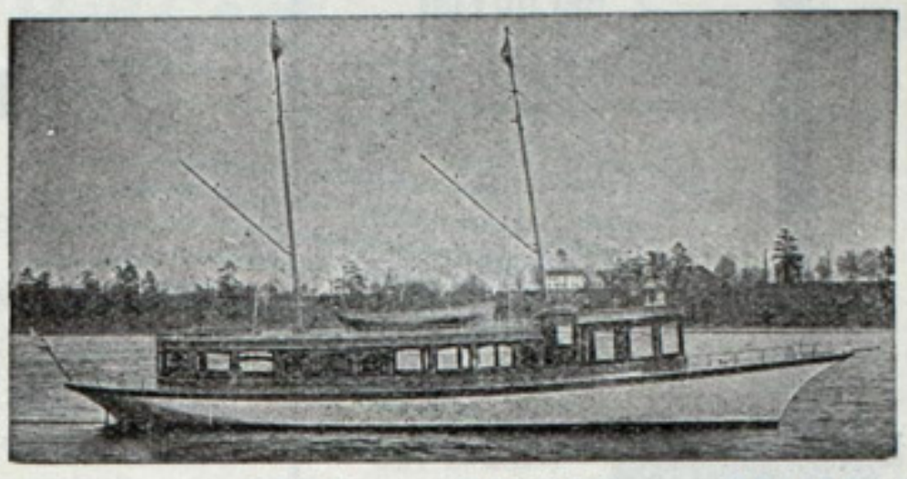
Time and Distance Tables for Lake Ships

A set of tables showing the time required at different rates of speed, 8 to 15 miles an hour, to cover distances between all ports on the Great Lakes. A time saver to the vessel owner or vessel agent as well as captain or engineer. Send for it on approval.

Price $1.00

MARINE REVIEW PUB. COMPANY
39-41 Wade Building, Cleveland, Ohio

A TRUSCOTT BOAT.



SIMPLE. SAFE. SPEEDY. RELIABLE.

It may be possible to build better and safer boats, but it hasn't been done yet. We send a completely illustrated catalogue and price list free, which tells you all about boats and why Truscott Boats Excel.

TRUSCOTT BOAT MFG CO. ST. JOSEPH, MICH.

WARRINGTON IRON WORKS, Builders of STEAM YACHTS, TOW BOATS and LAUNCHES.

Marine Engines, Boilers and Tanks.
Heavy Machinery and Plate Iron Works.

Foot of West Wellington St., CHICAGO, ILLINOIS.

J. B. COWLE, Pres. W. E. PERKINS, Sec'y and Treas.
MAT. THOMAS, Gen'l Mgr.

The Union Machine & Boiler Company,

MACHINISTS, FOUNDERS AND BOILER MAKERS.

Jobbing solicited. Steel vessel repairs promptly attended to night or day.

108 TO 114 RIVER STREET. CLEVELAND, O.

Phones: Bell Main 609. Cuy. A. 711. Night Call Cuy. M. 1843.

ABRAM SMITH & SON,
ALGONAC, MICH.

Wooden Ship Building and Rebuilding.

Before placing your work we will be pleased with an opportunity to quote YOU our prices.

The Graham Coal & Coke Company, Ltd.

1008-9 Chamber of Commerce

WHOLESALE

COAL AND COKE

Exceptional facilities for Supplying Vessels.

Steamboat fueling pockets at foot of 21st Street.

Detroit, Mich.

Dock Phone Mich. W 266

SHEPARD'S HORSE POWER SCALE

FOR DETERMINING
HORSE POWER,
SIZE OF CYLINDERS,
DENSITY, TEMPERATURE,
LATENT HEAT OF STEAM.

Has sold in great numbers at $1 each.

OFFERED AS A PREMIUM WITH ONE YEAR'S SUBSCRIPTION TO THE MARINE REVIEW AND MARINE RECORD AT $3.00.

CASTNER, CURRAN & BULLITT,

SOLE AGENTS FOR

C. C. B. POCAHONTAS SMOKELESS SEMI-BITUMINOUS **COAL**

C.C.B. POCAHONTAS COAL — Trade Mark Registered

THE BEST STEAM COAL IN THE WORLD.

Officially endorsed by Great Britain and United States. Standard Fuel of United States Navy. For ten years used exclusively on Cunard, White Star and other Transatlantic Lines.

Main Office, Arcade Bldg., 1 S. 15th St., PHILADELPHIA, PA.

BRANCH OFFICES:

1 Broadway, New York.
Citizens' Bank Building, Norfolk, Va.
Old Colony Building, Chicago, Ill.
70 Kilby Street, Boston, Mass.
4 Fenchurch Avenue, London, England.
Terry Building, Roanoke, Virginia.
Neave Building, Cincinnati, Ohio.

PITTSBURG COAL COMPANY.

Steamboat Fueling Facilities at Various Points on the Great Lakes:

CLEVELAND HARBOR { 4 Car Dumpers. 3 Lighters.
FAIRPORT HARBOR { 1 Car Dumper. 1 Lighter.
ASHTABULA HARBOR { 1 Car Dumper. 1 Lighter.
ERIE HARBOR { 1 Car Dumper. Fuel Pockets.
DETROIT RIVER BRANCH { Docks and Pockets at Sandwich and Amherstburg.
SAULT RIVER BRANCHES { Dock and Pockets at Detour. Dock and Pockets at Sault Ste. Marie. (The Port Royal Dock Co.)

WE FURNISH ONLY THE BEST GRADE OF **Pittsburg and Youghiogheny Coal.**

GENERAL OFFICE, LAKE DEPARTMENT, PERRY-PAYNE BUILDING, CLEVELAND, OHIO.

STEAMBOAT FUEL AT CHICAGO.

THE Y&L

Youghiogheny and Lehigh Coal Company.

J. T. CONNERY, Manager — ARCHIE J HITCHCOCK, Dock Sup't.

Main Office: 902-906 Fisher Bldg.,

277 DEARBORN STREET.

FUEL DOCKS.

No. 1, Michigan Slip and Basin, - - 'Phone Har. 4156.
No. 2, North Halsted Street Bridge, - 'Phone Har. 4157.
No. 3, Foot South Water St. and Illinois Central Slip C. 'Phone Har. 4158.

FUEL LIGHTER.

Equipped with 125 2-ton Buckets for Fueling Anywhere in Harbor.

Long Distance Telephone, Har. 4156.

The Rochester & Pittsburgh Coal & Iron Co.—Steamboat Fuel Dock—Blackwell Canal at Michigan St. Bridge. 1400 feet of dock frontage. Hulett Car Dumping Machine. Steam Fuel Scow of 550 tons capacity. Boats coaled day or night. Office: 684-88 Ellicott Sq. Buffalo, N. Y. Telephone, Seneca 1154.

E. McQ. Duthie, Cargo and Fuel Agent.

REYNOLDSVILLE COAL.

STANLEY B. SMITH & CO.

DETROIT, MICH. **COAL** TOLEDO, OHIO.

SMITH'S COAL DOCK DETROIT RIVER — 12 POCKETS PLATFORM LOW DOCK

TOLEDO HARBOR — 2 LIGHTERS 2 DERRICKS (REVOLVING) 2 LOW DOCKS

SHIPPERS OF COAL BY RAIL AND LAKE.

A COMPLETE SET OF CHARTS OF THE GREAT LAKES

ELEVEN IN ALL.

(Edges bound with Tape to Prevent Tearing.)

Sent to any Address, Carriage Prepaid, for $5.45.

THE MARINE REVIEW PUB. CO., 39-41 WADE BUILDING, CLEVELAND, OHIO.

VESSEL AND INSURANCE AGENTS.

T. R. McCARTHY,

STEAMSHIP and FREIGHT BROKER.

Chartering, Forwarding and General Commission Agent; and Broker for the Sale, Purchase and Construction of Steamers and Sailing Vessels.

Marine and Fire Insurance Effected.

Cable address: "MACARTHY, MONTREAL."

(Watkins', Scott's, Lieber's and A. B. C. Codes used.)

Shipping Agent to THE ASBESTOS & ASBESTIC CO., Ltd., of Danville, Que.

6 St. Sacrament St. - - - - - - - - Montreal, Can.

Correspondence invited and Agencies Solicited.

C. W. Elphicke. H. B. Earhart.

C. W ELPHICKE & CO.,

VESSEL AND INSURANCE AGENTS,

Rooms 9-11, No. 6 Sherman St., CHICAGO, ILL.
Long Distance Telephone, Harrison 1194.

W. A. Hawgood. Arthur H. Hawgood.

W. A. HAWGOOD & CO.,

VESSEL and INSURANCE AGENTS.

220-221 Perry-Payne Bldg., - - - CLEVELAND, O.

Long Distance Telephone, Main 2395.
Residence Telephone, W. A. Hawgood, Doan 84-J.
Residence Telephone, Arthur H. Hawgood, Doan 841-J

John Mitchell. John F. Wedow. Alfred Mitchell.

MITCHELL & CO.,

VESSEL and INSURANCE AGENTS,
508, 509 & 510 Perry-Payne Bldg.

Office Telephone, M 767. Residence, John Mitchell, Doan, 341. John F. Wedow, Doan, 141-J.

Alfred Mitchell, Doan, 218.

CLEVELAND, - - - - - - - - - - - OHIO.

C. L. Hutchinson. W. H. McGean.

HUTCHINSON & CO.,

VESSEL and INSURANCE AGENTS,

Office Telephone, Main 2453.
Residence, C. L. Hutchinson, Ridge 345-L.
Residence, W. H. McGean, East 1421-J.
313-315 Perry-Payne Bldg., - - CLEVELAND, O.

W. C. RICHARDSON,

VESSEL OWNER and BROKER
and
MARINE INSURANCE AGENT,

420-421 Perry-Payne Bldg. - - CLEVELAND, O.
Office Telephone 338; Residence Telephone, 2938.

D. Sullivan. F. J. Sullivan.

D. SULLIVAN & CO.

VESSEL AGENTS.
MARINE INSURANCE.

2-4 Sherman Street, - - - - - - CHICAGO, ILL.
Office Tel., Harrison 2847; Residence, Ashland 2483.

R. J. DUNHAM,

VESSEL AGENT. MARINE INSURANCE.

214 Sherman Street, - - - - - CHICAGO, ILL.

TELEPHONES:

Office, Harrison, 2630; Residence, Dearborn, 671.

John B. Hall. Harry B. Root.

HALL & ROOT,

VESSEL AGENTS.

21-22 Exchange Bldg, 202 Main Street.,

Telephone, Seneca, 892. BUFFALO, N. Y.

W. W. BROWN.

Member Cleveland Stock Exchange.

Buys and Sells all Kinds of Vessel Property.

1105-1106 Williamson Bldg., - - CLEVELAND, O.

JOHN J. BOLAND,

VESSEL and INSURANCE AGENT.

25-26 Exchange Building, 202 Main St.

Telephone, Seneca, 115. BUFFALO, N. Y.

J. J. H. Br..n. J. B. Rodgers. Edward Smith.

BROWN & CO.,

VESSEL and INSURANCE AGENTS,

202 Main Street, - - - - - - BUFFALO, N. Y.

VESSEL AND INSURANCE AGENTS.

D. T. HELM & CO.

VESSEL and INSURANCE AGENTS.

Telephones—Office, 263
Res. 381-3.

DULUTH, - - - - - - - - - - MINN.

SAMUEL HOLMES,

STEAMSHIP OFFICES, Morris Building. 66-68 Broad St.,

For Selling, Chartering and Building all Classes Steam Vessels.

Steam Vessel Circulars.
Weekly Freight Circulars. NEW YORK.

RUFUS S. KING,

Commission Merchant and Broker

MARITIME BUILDING, 6-10 BRIDGE ST.,
Near Battery Park, NEW YORK.

Has the Largest List of Steamships and Sailing Vessels for Sale in America, Consequently Most Bargains.

Buying, Selling and Building of Steamships, Ships, Yachts, Tugs, Steam Lighters, Schooners, Barges, etc.

Expert on Valuation of Steam and Sailing Vessels.

CABLE ADDRESS, "RUFUS," WATKINS' CODE.
TELEPHONE, 3404 BROAD.

F. H. WEEKS,

MARINE BROKER,

Vessels Sold, Chartered, Built and Insured.
Cable Address, WEEKSHIP, New York.

Telephone, 3275 Broad. 32 Broadway, New York.

Charles P. Notman. David H. E. Jones.

JAMES W. ELWELL & CO.,

Established 1830.

SHIP BROKERS and STEAMSHIP AGENTS.

Sell and Charter all Classes of Vessels.

Agents for Cyprien Fabre & Cie. S. S. Line, Cie. Havraise Peninsulaire, and Northwestern S. S. Co.

Battery Park Bldg., 21-24 State St. NEW YORK.

PROCTORS IN ADMIRALTY.

McPherson, Clark, Campbell & Jarvis,

Barristers-at-Law, Attorneys, Proctors in Admiralty.
(Trust and Guaranty Building)

16 King St. West, - - - TORONTO, CANADA.

ADMIRALTY AND MINING.

Telegraphic Address, "Clapher-Toronto."
(W. D. McPherson and J. M. Clark authors of "The Law of Mines in Canada.")

RAY G. MacDONALD,

Attorney-at-Law and Proctor in Admiralty.

Suite 618 New York Life Building,

Telephone, Central 723. CHICAGO, ILL.

SHAW, WARREN, CADY & OAKES,

Attorneys-at-Law,

904 to 907 Union Trust Bldg.,..

Telephone, 685. DETROIT, MICH.

C. E. KREMER,

Counsellor at Law and
Proctor in Admiralty.

Suite 821-822 - - - - New York Life Building.

CHICAGO - - ILL.

H. H. BACON,

Attorney and Counsellor at Law
and Proctor in Admiralty.

NOTARY PUBLIC WITH SEAL.

Rooms 25 and 26 City Bank Building,

319 Main Street, - - - - - BUFFALO, N. Y.

PROCTOR IN ADMIRALTY.

HARVEY L. BROWN,

PROCTOR IN ADMIRALTY.

35 White Building, - - - - - BUFFALO, N. Y.

HOYT, DUSTIN & KELLEY,

LAWYERS AND PROCTORS IN ADMIRALTY.

Offices, 702 Western Reserve Building,

CLEVELAND, - - - - - - - - - OHIO.

White, Johnson, McCaslin & Cannon,

ATTORNEYS-AT-LAW and
PROCTORS IN ADMIRALTY.

Williamson Building, - - - - CLEVELAND, O.

GOULDER, HOLDING & MASTEN,

LAW OFFICES,

Harvey D. Goulder, S. H. Holding, Frank S. Masten.

Perry-Payne Building, - - - CLEVELAND, O.

ALBERT J. GILCHRIST,

PROCTOR IN ADMIRALTY.

604 Perry-Payne Building, - - - CLEVELAND, O.

O. C. Pinney. Dorr E. Warner.

PINNEY & WARNER,

LAWYERS AND PROCTORS IN ADMIRALTY.

Rooms 316 and 317 Perry-Payne Building.

Telephone, Main 2585 - - - - CLEVELAND, O.

H. R. SPENCER,

MARINE LAW,

BOARD OF TRADE BUILDING,

DULUTH, - - - - - - - - - MINN.

PROFESSIONAL.

W. J. WOOD,

NAVAL ARCHITECT & CONSULTING ENGINEER.

Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs. Arbitrator and court expert.

Vessels designed—Twin S. S. Virginia, U. S. S. Frolic, formerly steam yacht Comanche, Twin S. S. North West and North Land, I. W. Nicholas, and many others, including Fire Boats, Tugs, Barges, etc.

Complete Plans Furnished For
Steel Composite or Wooden Vessels.

709 Rialto Building - - - - - - CHICAGO.
Tel. Harrison 1020.

R. L. NEWMAN, Consulting Engineer, Naval Architect.

SHIP AND YACHT BROKER.

Attention to development of designs and superintendence during construction. Vessels for carrying oil in bulk a specialty; also surveys on general repairs. Oil fuel systems for marine and land purposes developed under the patents of the International Oil Fuel Construction Company of New York.

817 Chesebrough Bldg., Bowling Green, NEW YORK.

JOSEPH KIDD,

Marine Architect and Surveyor. Consulting Ship Builder and Engineer.

Over thirty years' experience. Specifications, Designs and Estimates, Superintendence of Construction and Repairs. Damage and Other Surveys carefully attended to. Negotiations for the building, charter or sale of all kinds of vessels and machinery.

610 Board of Trade, - - - - DULUTH, MINN.

AMBROSE V. POWELL, M. Am. Soc. C.E.

CIVIL ENGINEER,

Designs and Constructs Dry Docks, Harbor Works, Docks and Plant for Handling Coal and Ore, Foundations.

Office, 1008 Chamber of Commerce, CHICAGO, ILL.

PROFESSIONAL

Members Maritime Association Port of N. Y.

SADLER, PERKINS & FIELD

Naval Architects and Engineers.
Chartering and Brokerage.
Maritime Building, New York.
NEW YORK. DETROIT.

HORACE SEE,

CONSULTING ENGINEER
and NAVAL ARCHITECT.
No. 1 Broadway, NEW YORK.

ROBERT LOGAN,

Marine Architect, Mechanical Draughtsman, Consulting Engineer.

Specifications and designs for all descriptions of Marine Vessels, Engines and Boilers, Superintends Construction and Repairs. Damage and other Surveys carefully attended to.

810 Western Reserve Bldg. CLEVELAND, O.

EDWARD GASKIN,

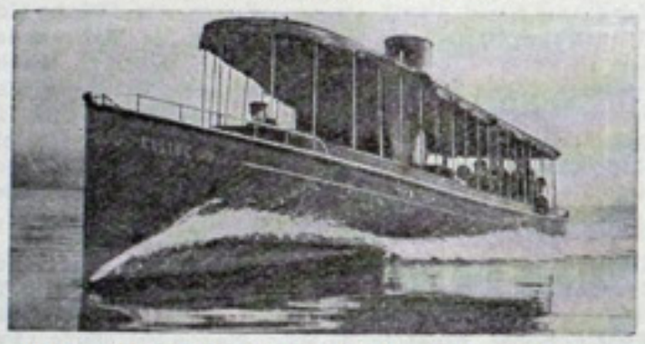
SHIP BUILDING EXPERT.

Plans and Specifications for Ships, Surveys and Estimates, superintendence, etc.

Ellicott Square, - - - - - BUFFALO, N. Y.

CHARLES D. MOSHER,

NAVAL ARCHITECT AND ENGINEER,
No. 1 Broadway, NEW YORK.



THE FASTEST YACHTS IN THE WORLD.

Arrow, 45.06 miles per hr. Ellide, 40.2 miles per hr. Feissen, 31.6 miles per hr. Norwood, 30.5 miles per hr. Presto, 31 miles per hr. Yankee Doodle, 29.5 miles.

The Mosher Patent Triple and Quadruple Expansion Engines and Water-tube Boilers. These boilers have been supplied for no less than eleven of the torpedo boats of the U. S. Navy, the U. S. Monitor, Florida and six torpedo boats for Russian government, besides for numerous other fast yachts and launches. Most powerful, lightest and compact boiler made.

Pittsburgh Testing Laboratory, Ltd.,

INSPECTING AND METALLURGICAL ENGINEERS AND CHEMISTS,
1750 Monadnock, CHICAGO. 235 Water Street, PITTSBURG,
906-7 Crozier Building, Philadelphia,
New York City, 60 New Street.
Richmond, Va., 1107 1-2 Main St.
Inspectors of Shipbuilding Materials and Machinery. Inspectors located at all mills. Physical and Chemical Laboratories. Tests of all kinds.

ROBERT W. HUNT & CO.

BUREAU OF INSPECTION.
TESTS AND CONSULTATION.
1121 The Rookery, Chicago.
Monong. Bank Bldg., Pittsburg.
71 Broadway, New York.
Inspectors of Shipbuilding Material and Machinery. Inspectors of all Materials. Duty Tests of Engines and Boilers. Physical and Chemical Laboratories.

STEEL SHIPS: Their Construction and Maintenance.
A manual for ship builders, ship superintendents, students and marine engineers.
BY THOMAS WALTON.
Price $5.50.
The Marine Review Pub. Co., Cleveland.

PATENTS.

E. L. Thurston. Albert H. Bates.

THURSTON & BATES,

Counselors at Law in Patent Causes, and Solicitors of Patents,
1028 Society for Savings Bldg., - CLEVELAND, O.

SCHWENCKE, KIRK & CO.,

Importers and Manufacturers of

DRAWING MATERIALS.

26 Church St, NEW YORK,
Factory, HOBOKEN, N. J.

Steamer for Sale.

Steamer T. D. Stimson for sale. Capacity 550,000 ft. lumber. Rates A-2; fully rebuilt two years ago. Will take smaller steamer part payment. Address A. B. Slyfield, owner, Port Huron, Mich. t f

Passenger Steamer and Tug for Sale.

Steamer Ogantz, 80 ft. keel, 18 ft. 8 in. beam, 7 ft. 6 in. draught. Fore and aft compound engine, 14 and 25 by 16 in. Scotch boiler, 10 ft. by 84 in., allowed 125 lbs. steam. Passenger allowance—45 regular and 190 excursion.

Tug Dan Connelley, 65 ft. keel, 16 ft. 6 in. beam. 8 ft. 6 in. draught. Iron boiler 13½ ft. by 76 in., allowed 90 lbs. steam. Double engine, 14x15 in.

These boats were in commission last season and are in good condition. Price reasonable. For particulars address The Sandusky Fish Co., Sandusky, O. tf

Schooner for Sale.

Schooner carrying 150 M. ft. of lumber or 90 cords of maple wood. Will be sold cheap for cash. For full particulars, address Box 37, Marine Review Pub. Co., Cleveland, O. tf

Schooner for Sale.

For Sale.—Schooner Bertha Barnes. Capacity 425 M. ft. of lumber. For particulars apply to James A. Myers, Royal Insurance Bldg., or L. Sargisson, 905 St. Louis ave., Chicago. tf.

Schooner for Sale.

Schooner Elida—Rates A2½. Tonnage, 182. Outfit in good condition. For sale cheap. Address owner—Christen Christensen, 573 Greenbush St., Milwaukee, Wis Apr 2

Barge for Sale.

For Sale—Barge City of Toledo. Owners retiring from business. Have no further use for her. Vessel and outfit in good condition. Light draught. Carries 350 M. ft. white pine lumber. Classed A2 in 1902. Not surveyed this year. Apply to H. E. Runnels, Port Huron, Mich., C. P. Gilchrist & Co., Cleveland, L. S. Sullivan, Toledo, or the owners, W. J. Clarke & Co., Toledo, O., where vessel can be seen. Apr. 2.

Nautical Encyclopedia
PRICE $3.00.

Is in all respects a work up to date, correct as to every term known to the shipping world.

Divided as to departments of Naval Architecture, Marine Engineering, etc.

SENT ON APPROVAL.
CARRIAGE PREPAID

ORDER FROM
THE MARINE REVIEW PUB. CO.,
39-41 Wade Bldg., CLEVELAND.

Steam Barge for Sale.

For Sale—Steam barge 131 ft. long, 25 ft. wide, 9 ft. deep; lumber capacity 260 M. ft.; coal 375 tons. Everything pertaining to this boat is in first class conditions. Terms cash. Address Lock Box 35, St. Clair, Mich. Mar. 26.

Tug for Sale.

Tug Maurice W. for sale. Practically new; 48 ft. over all, 12 ft. beam, 5½ ft. draught. Engine, boiler and wheel of Sutton Bros. make. Engine 10x12; 100 lbs. steam; 50 in. wheel. Cheap for cash. Address L. E. Welch, Mackinaw City, Mich. t. f.

Scotch Marine Boiler for Sale.

Scotch Marine Boiler for sale. Size, 10 ft. by 78 in.; triple riveted; ⅝ steel plate; dome 56 in. by 24 in.; two 4-in. and one 6-in. inlet in the dome; ninety-eight 3-in. tubes; stays ⅝ center; allowed 169 lbs. steam pressure to the square inch. Boiler as good as new. Located at Detroit, Mich. For price address Isaac Applebaum, 38-40 Randolph street, Detroit,

For Sale or Charter.

Large, side-wheel passenger steamer, allowed by Government inspection to carry 800 passengers. Excellent equipment; large dining room; electric lights and searchlight, etc. For full information apply to Howard S. Folger, Kingston, Ont., Canada. t f

Steam Barge for Sale.

For Sale—Steam barge 126 ft. keel, 26 ft. beam, 12 ft. deepest load draught. Capacity 300 M. ft. lumber; 450 tons coal. In good condition. Extensive repairs to hull, boi er and machinery in 1901 and 1902. Will be sold cheap for cash. Address Owner, 1323 Cedar Ave., Cleveland, O. Mar. 26.

Steamer for Sale.

For Sale.—Steamer City of Grand Rapids. In good condition and will sell at a bargain. For particulars address Barry Trans. Co., Chicago, Ill. Apr. 2.

Steamer For Sale.

For sale at a bargain, steamer Cambria, a-Canadian boat, 206 ft. long and 40 ft. beam, fitted with feather dip paddles, electric light ing plant; fully equipped with all sailing appliances; used for both passenger and freight purposes. Will sell for $3,000.00 Address, Frank Lenahan & Son, 53 Fulton St., Buffalo, N. Y. tf.

Two Tugs For Sale.

Tug John Johnson—Engine 20½x22; boiler allowed 120 lbs. steam. Tug Warwick—Engine 15 by 17; boiler allowed 110 lbs. steam. Both boats, engines and boilers practically new and in first-class condition. Boats can be seen at Toledo any time. Cheap for cash. Enquire of James Rooney, 1118 Collingwood Ave., Toledo, O. tf

Wanted.

"Wanted" and "For Sale" advertisements are published in the Marine Review at the rate of $1 per inch per issue. Try it, and get quick results. Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O.

FOR SALE.
STEAMBOAT ENGINES.

Two pair 7 x 9 double cylinder vertical reversible **steam engines** of the Crane elevator engine style. Send for blue print, photos and price. Also **pumps, condensers** and **small engines for electric lights.**

CLYDE MACHINE WORKS
33d St. and Shields Ave. - Chicago, Ill.

BUYERS' DIRECTORY OF THE MARINE TRADE.

For a more complete classification than that represented by advertisers in the Marine Review and Marine Record, see the BLUE BOOK OF AMERICAN SHIPPING, marine and naval directory of the United States, published by the Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland.

See accompanying index of Advertisers for full addresses of concerns in this directory.

AIR COMPRESSORS, AIR HOISTS, ETC.

Chicago Pneumatic Tool Co.....Chicago.
"Long Arm" System Co.....Cleveland.

AIR PUMPS AND APPLIANCES.

Fore River Ship & Engine Co.....Quincy, Mass.

ANCHORS.

Baldt Anchor Co.....Chester, Pa.
Bowers, L. M. & Co. .....Binghamton, N. Y.
DeGrauw, Aymar & Co. .....New York.
Seaboard Steel Casting Co.....Chester, Pa.

ANTI-FRICTION METALS.

Cramp, Wm. & Sons.....Philadelphia.
Hardy, Wm. A.....Fitchburg, Mass.
Phosphor Bronze Smelting Co., Ltd....Philadelphia.
Pittsburg White Metal Co. .....Pittsburg, Pa.

ARTIFICIAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
Bloomsburg & Co., H.....Newport News, Va.
Buffalo Forge Co.....Buffalo.
Detroit Shipbuilding Co.....Detroit.
Sturtevant, B. F. Co.....Boston.

ASBESTOS.

Johns-Manville Co., H. W.....New York.

ATTORNEYS AND PROCTORS IN ADMIRALTY.

Bacon, H. H.....Buffalo.
Brown, Harvey L.....Buffalo.
Gilchrist, Albert J.....Cleveland.
Goulder, Holding & Masten.....Cleveland.
Hoyt, Dustin & Kelley.....Cleveland.
Kremer, C. E. .....Chicago.
MacDonald, Ray G.....Chicago.
McPherson, Clark, Campbell & Jarvis.....Toronto.
Pinney & Warner.....Cleveland.
Shaw, Warren, Cady & Oakes.....Detroit.
Spencer, H. R.....Duluth.
White, Johnson, McCaslin & Cannon.....Cleveland.

BANKERS.

Fahey & Co.....Cleveland.
Federal Trust Co. .....Cleveland.
Cleveland Trust Co.....Cleveland.

BAROMETERS, MARINE GLASSES, ETC.

Bliss, John & Co.....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

BELTING, RUBBER.

New York Belting & Packing Co.....New York.

BLOCKS, SHEAVES, ETC.

Boston & Lockport Block Co.....Boston, Mass.
Cleveland Block Co.....Cleveland.

BLOWERS.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co.....Boston.

BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Kahnweiler's Sons, David.....New York.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & D. D. Co., ...
.....Mariner's Harbor, S. I., N. Y.
Marine Iron Works.....Chicago.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

BOILER MANUFACTURERS.

Almy Water Tube Boiler Co.....Providence, R. I.
American Ship Building Co.....Cleveland.
Atlantic Works.....East Boston, Mass.
Babcock & Wilcox Co.....New York.
Bath Iron Works, Ltd.....Bath, Me.
Boyer's Sons, L.....New York.
Chicago Ship Building Co.....Chicago.
Clyde Machine Works.....Chicago.
Columbia Iron Works..... Port Huron.
Cramp, Wm. & Sons.....Philadelphia.
Dearing Water Tube Boiler Co.....Detroit.
Delauney Belleville & Co.....St. Denis, France.
Detroit Shipbuilding Co.....Detroit.
Fletcher, W. & A. Co.....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Forest City Boiler Co..... ..... Cleveland.
Jenks Ship Building Co.....Port Huron, Mich.
Kingsford Foundry & Machine Works..Oswego, N. Y.
Lake Erie Boiler Works.....Cleveland.
MacKinnon Mfg. Co.....Bay City, Mich.
Maryland Steel Co.....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co.....Seattle, Wash.
Mosher, Chas. D.....New York.
Neafie & Levy Ship & Engine Building Co...Phila.
Newport News Ship Building Co..Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co.....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roberts Safety Water Tube Boiler Co...New York.
Stirling, The Co.....Chicago.
Superior Ship Building Co.....Superior, Wis.
Taylor Water Tube Boiler Co.....Detroit.
Trigg, Wm. R Co.....Richmond, Va.
Union Machine & Boiler Co.....Cleveland.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co .....Chicago.

BOILER COMPOUNDS.

Dearborn Drug & Chemical Works.....Chicago.

BOILER COVERING.

Johns-Manville Co., H. W.....New York.

BOILER RIVETS.

Bourne-Fuller Co.....Cleveland.

BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co. .....Cuyahoga Falls, O.

BRASS AND BRONZE CASTINGS.

Cramp, Wm. & Sons .....Philadelphia.
Fore River Ship & Engine Co.....Quincy, Mass.
Macbeth Iron Co.....Cleveland.
Phosphor Bronze Smelting Co. .....Philadelphia.

BRASS—SHEET, ROD, ETC.

Waterbury Brass C .....New York.

BRASS WORK, MARINE.

Farnan Brass Works .....Cleveland.

BRIDGES, BUILDERS OF

Scherzer Rolling Lift Bridge Co. .....Chicago.

BUCKETS, ORE AND COAL.

Bartlett & Snow Co., C. O. .....Cleveland.
Brown Hoisting & Conveying Machine Co. Cleveland.
Lake Erie Boiler Works.....Cleveland.
Webster, Camp & Lane Co.....Akron, O.

CABIN AND CABINET FINISHING WOODS.

Martin-Barriss Co.....Cleveland.

CAPSTANS.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co. .....Bath, Me.

CAST IRON PIPE.

Wood & Co., R. D. .....Philadelphia.

CEMENT, IRON, FOR REPAIRING LEAKS.

Smooth-On Mfg. Co. .....Jersey City, N. J.

CHAINS.

Standard Chain Co. .....Pittsburg.

CHAIN HOISTS.

Boston & Lockport Block Co. .....Boston, Mass.
Dake Engine Co. .....Grand Haven, Mich.

CHARTS.

Marine Review Pub. Co.....Cleveland.
Potter, J. D.....London.

CIRCULATOR, EQUILIBRIUM,

With Steam Heating Attachment.

Bloomsburg & Co., H. .....Baltimore, Md.

CLOCKS (Marine), CHRONOMETERS, BELLS.

Ashton Valve Co. .....Boston.
Bliss, John & Co. .....New York.
Chelsea Clock Co. .....Boston.
Ritchie, E. S. & Sons.....Brookline, Mass.

COAL PRODUCERS AND SHIPPERS.

Castner, Curran & Bullitt .....Boston.
Graham Coal & Coke Co., Ltd.....Detroit.
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.
Pittsburg Coal Co. .....Cleveland.
Rochester & Pittsburg Coal & Iron Co. ....Buffalo.

COAL AND ORE HANDLING MACHINERY.

Bartlett & Snow Co., C. O. .....Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
Lidgerwood Mfg. Co.....New York.
Webster, Camp & Lane Co.....Akron, O.

COMPASSES.

Bliss, John & Co. .....New York.
Ritchie, E. S. & Sons.....Brookline, Mass.

CONDENSER TUBE PACKING.

Allen, Joseph .....Collingswood, N. J.

CONTRACTORS FOR PUBLIC WORKS.

Smith Co., L. P. & J. A. .....Cleveland.

COPPER, TIN AND SHEET IRON WORK.

Lake Erie Boiler Works.....Cleveland.
McCutcheon, C. H.....Buffalo.
Topky Brothers .....Ashtabula, O.

COPPER—SHEET, TUBES AND ROD.

Waterbury Brass Co.....New York.

CORDAGE.

Baker & Co., H. H.....Buffalo.
DeGrauw, Aymar & Co.....New York.
Upson-Walton Co.....Cleveland.

CORK JACKETS AND RINGS.

Armstrong Cork Co. ....Pittsburg, Pa.
Kahnweiler's Sons, D. ....New York.
Lane & DeGroot ..... Long Island City, N. Y.

CHAIN CONVEYORS, HOISTS.

Bartlett & Snow Co., C. O. .....Cleveland.
Brown Hoisting Machinery Co., (Inc.)...Cleveland.
Chicago Pneumatic Tool Co. .....Chicago.
General Electric Co. .....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Railway Appliances Co .....Chicago.
Westinghouse Electric & Mfg. Co. .....Pittsburg.

DEAD-LIGHTS, AIR-PORTS, ETC.

"Long-Arm" System Co. .....Cleveland.

DIPPER TOOTH FOR DREDGES AND STEAM EXCAVATORS.

Pryor Patent Excavator Tooth Co..Houghton, Mich.

DIVING APPARATUS.

Morse, A. J. & Son.....Boston.
Schrader's Son, A. .....New York.

DOORS, WATER TIGHT, ETC.

Long Arm System Co.....Cleveland.

DRAWING MATERIALS.

Schwencke, Kirk & Co.....New York.

DREDGE ENGINES FOR HANDLING DUMP SCOW LINES.

Superior Iron Works .....West Superior, Wis.

DREDGING CONTRACTORS.

Smith Co., L. P. & J. A. .....Cleveland.

DRILL PRESSES—DRILLS OF ALL KINDS.

Cleveland Punch & Shear Works Co. ....Cleveland.
Railway Appliances Co .....Chicago.

DRYING APPARATUS.

Buffalo Forge Co.....Buffalo.
Sturtevant, B. F. Co. .....Boston.

DRY DOCKS.

American Ship Building Co. .....Cleveland.
Atlantic Works .....East Boston, Mass.
Baltimore Ship Building Dry Dock Co...Baltimore.
Bath Iron Works, Ltd. .....Bath, Me.
Buffalo Dry Dock Co. .....Buffalo.
Chicago Ship Building Co. .....Chicago.
Craig Ship Building Co. .....Toledo, O.
Cramp, Wm. & Sons .....Philadelphia.
Detroit Ship Building Co. .....Detroit.
Lockwood Mfg. Co. .....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Marine Construction & Dry Dock Co. ....New York.
Maryland Steel Co. .....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co. .....Wilmington, Del.
Shipowners Dry Dock Co. .....Chicago.
Superior Ship Building Co.....Superior, Wis.

ELECTRIC HOISTS AND CRANES.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Lidgerwood Mfg. Co.....New York.
Westinghouse Electric & Mfg. Co. ..Pittsburg, Pa.

ELECTRIC FIXTURES AND APPLIANCES.

General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co.....Pittsburg, Pa.

ELECTRIC LIGHT AND POWER PLANTS.

Buffalo Forge Co. .....Buffalo.
Electro-Dynamic Co. .....Philadelphia.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co.....Detroit.
Sturtevant, B. F. Co. .....Boston.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

ELECTRIC STEERING GEAR, SPEED AND RUDDER INDICATORS, ETC.

Electro-Dynamic Co. .....Philadelphia.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
Atlantic Works .....East Boston, Mass.
Bath Iron Works, Ltd. .....Bath, Me.
Buffalo Forge Co. .....Buffalo.
Chicago Ship Building Co.....Chicago.
Chase Machine Co. .....Cleveland.
Columbia Iron Works .....Port Huron.
Craig Ship Building Co. .....Toledo, O.
Cramp, Wm. & Sons .....Philadelphia.
Dake Engine Co.....Grand Haven, Mich.
Detroit Ship Building Co. .....Detroit
Fletcher, W. & A. Co. .....Hoboken, N. J.
Fore River Ship & Engine Co.....Quincy, Mass.
Great Lakes Engineering Works.....Detroit, Mich.
Hall Bros. .....Philadelphia.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co. .....East Boston, Mass.
MacKinnon Mfg. Co. .....Bay City, Mich.
Maryland Steel Co. .....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Mosher, Chas. D. .....New York.
Neafie & Levy Ship & Engine Bldg. Co. Philadelphia.
Newport News Ship Building Co. Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roach's Ship Yard .....Chester, Pa.
Thropp, J. E. & Sons Co. .....Trenton, N. J.
Sheriffs Mfg. Co. .....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Trigg, Wm. R. Co.....Richmond, Va.
Trout, H. G. .....Buffalo.
Warrington Iron Works .....Chicago.
Willard, Chas. P. & Co. .....Chicago.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son .....New York.
Electro-Dynamic Co. .....Philadelphia.
MacLean Hydraulic Signal Co.....Chicago.
Seidler-Miner Electric Co. .....Detroit.

ENGINEERING BOOKS.

Audel & Co., Theo.....New York.
Marine Review Pub. Co.....Cleveland.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co. .....Chicago.
Farnan Brass Works .....Cleveland.
Kieley & Mueller .....New York.
McCutcheon, C. H. .....Buffalo.
New York Belting & Packing Co.....New York.
Reilly Repair & Supply Co., James.....New York.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Electro-Dynamic Co. .....Philadelphia.
Garrett-Cromwell Engineering Co.....Cleveland.
Gaskin, Edward .....Buffalo.
Hunt, Robt. W. & Co. .....Chicago.
Kidd, Joseph .....Duluth, Minn.
Logan, Robert .....Cleveland.
Mosher, Chas D. .....New York.
Newman, R. L.....New York.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.
Powell, Ambrose V. .....Chicago.
Roelker, H. B. .....New York.
Sadler, Perkins & Field.....New York.
See, Horace .....New York.
Wood, W. J. .....Chicago.

EVAPORATING AND DISTILLING APPARATUS.

Reilly Repair & Supply Co., James....New York.

FANS FOR VENTILATION, EXHAUST, ETC.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co. .....Boston.

FEED WATER PURIFIERS AND HEATERS.

Learmonth, Robert .....Buffalo.
Reilly Repair & Supply Co., James.....New York.
Ross Valve Co. .....Troy, N. Y.

FIXTURES FOR LAMPS, OIL AND ELECTRIC.

General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

FORGES.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co. .....Boston.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co. .....Cleveland.
Fore River Ship & Engine Co. .....Quincy, Mass.
Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons .....Cleveland.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

FUELING COMPANIES AND COAL DEALERS.

Castner, Curran & Bullitt (Pocahontas) ....Phila.
Graham Coal & Coke co., Ldt.....Detroit.
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.
Pittsburg Coal Co. .....Cleveland.
Rochester & Pittsburg Coal & Iron Co. ....Buffalo.
Smith, Stanley B. & Co. .....Detroit.
Youghiogheny & Lehigh Valley Coal Co...Chicago.

GASKETS, RUBBER.

New York Belting & Packing Co.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co. ..New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co. .....Cleveland.

GAGES, STEAM AND VACUUM.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.

GRAPHITE.

Dixon Crucible Co., Joseph .....Jersey City, N. J.

HAMMERS, STEAM.

Chase Machine Co. .....Cleveland.
Railway Appliances Co .....Chicago.

HARDWARE, SHIP.

Topky Brothers .....Ashtabula, O.

HATCH GEARS.

"Long-Arm" System Co. .....Cleveland.

HEATING APPARATUS.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co. .....Boston.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
Brown Hoisting Machinery Co., Inc. ....Cleveland.
Chase Machine Co. .....Cleveland.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....New York.
Hyde Windlass Co. .....Bath, Me.
Lidgerwood Mfg. Co.....New York.
Marine Iron Co. .....Bay City.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

HOSE FITTINGS.

Farnan Brass Works. .....Cleveland.

HOSE, RUBBER.

New York Belting & Packing Co.....New York.

HYDRAULIC MACHINERY.

Watson-Stillman Co., The.....New York.
Wood & Co., R. D. .....Philadelphia.

ICE MACHINERY.

American Linde Refrigerating Co. .....New York.
Roelker, H. B. .....New York.

INDICATORS FOR STEAM ENGINES.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.

INJECTORS.

American Injector Co.....Detroit.
Crane Co. .....Chicago.
Jenkins Bros. .....New York.
Lunkenheimer Co. .....Cincinnati.
Penberthy Injector Co. .....Detroit, Mich.

INSURANCE, MARINE.

Brown & Co. .....Buffalo.
Brown, W. W. .....Cleveland.
Dunham, R. J. .....Chicago.
Elphicke, C. W. & Co. .....Chicago.
Hawgood & Co., W. A. .....Cleveland.
Helm & Co., D. T.....Duluth.
Hutchinson & Co. .....Cleveland.
Insurance Co. of North America....Philadelphia
McCarthy, T. R. .....Montreal.
McCurdy, Geo. L. .....Chicago.
Mitchell & Co. .....Cleveland.
Peck, Chas. E. & W. F. ...New York and Chicago.
Richardson, W. C. .....Cleveland.
Sullivan, D. & Co. .....Chicago.
Weeks, F. H. .....New York.

IRON ORE AND PIG IRON.

Bourne-Fuller Co. .....Cleveland.
Hanna, M. A. & Co. .....Cleveland.
Pickands, Mather & Co. .....Cleveland.

LATHE, FOR CUTTING PIPE THREADS.

Kent Machine Works .....Brooklyn, N. Y.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Construction & D. D. Co.....
.....Mariner's Harbor, S. I., N. Y.
Truscott Boat Mfg. Co.....St. Joseph, Mich.
Warrington Iron Works .....Chicago.
Willard, Chas. P. .....Chicago.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong Cork Co. .....Pittsburg.
Drein, Thos. & Son .....Wilmington, Del.
Kahnweiler's Sons, D. .....New York.
Lane & DeGroot .....Long Island City, N. Y.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.

LIGHTS, SIDE AND SIGNAL.

Helvig, H. A. J.....New York.
Russell & Watson .....Buffalo.

LOGS.

Walker & Sons, Thomas .....Birmingham, Eng.
Nicholson Ship Log Co. .....Cleveland.
Also Ship Chandlers.

LUMBER.

Martin-Barriss Co..... Cleveland.
Moran Bros. Co..... Seattle, Wash.

MACHINISTS.

Chase Machine Co.....Cleveland.
Macbeth Iron Co. .....Cleveland.
Union Machine & Boiler Co.....Cleveland.
Ward Machine Co.....Cleveland.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc. .....Philadelphia.

MACHINERY, NEW AND SECOND HAND.

Bowler & Co. Geo. H. .....Cleveland.
Clyde Machine Works.....Chicago.

MAN-HOLES, SWING DOORS, ETC.

"Long-Arm" System Co. .....Cleveland.

MARINE RAILWAYS, BUILDERS OF

Crandall & Son, H. I. .....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co. .....Cleveland
Bloomsburg & Co., H. .....Baltimore, Md.
Buffalo Forge Co. .....Buffalo.
Detroit Ship Building Co. .....Detroit
Sturtevant, B. F. Co. .....Boston.

METALLIC PACKING.

Allen, Joseph .....Collingswood, N. J.
American Metallic Packing Co ..... Cleveland.
Hayden Mfg. Co., N. L.....Columbus, O.
Katzenstein, L. & Co. .....New York.
U. S. Metallic Packing Co. .....Philadelphia.

METAL POLISH.

Bertram's Oil Polish Co. .....Boston.

MOTORS, GENERATORS—ELECTRIC.

Buffalo Forge Co. .....Buffalo.
Electro-Dynamic Co. .....Philadelphia.
Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
"Long-Arm" System Co. .....Cleveland.
Seidler-Miner Electric Co. .....Detroit.
Sturtevant, B. F. Co. .....Boston.
United Marine Mfg. & Supply Co.....New York.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

NAUTICAL INSTRUMENTS.

Bliss, John & Co. .....New York.
Ritchie, E. S. & Sons .....Brookline, Mass.

NAVAL ARCHITECTS.

Gaskin, Edward .....Buffalo.
Kidd, Joseph .....Duluth, Minn.
Logan, Robert .....Cleveland.
Mosher, Chas. D. .....New York.
Newman, R. L. .....New York.
Sadler, Perkins & Field.....New York
See, Horace.....New York.
Wood, W. J. .....Chicago.

OAKUM.

DeGrauw, Aymar & Co. .....New York.
Stratford Oakum Co.,.....Jersey City, N. J.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph .....Jersey City, N. J.
Standard Oil Co. .....Cleveland.

PACKING.

Allen, Joseph .....Collingswood, N. J.
American Metallic Packing Co. .....Cleveland.
American Steam Packing Co. .....Boston.
Crane Co. .....Chicago.
Hayden Mfg. Co., N. L.....Columbus, O.
Jenkins Bros. .....New York.
Katzenstein, L. & Co. .....New York.
New York Belting & Packing Co.....New York.
United States Metallic Packing Co. ....Philadelphia.

PAINTS.

Baker, Howard H. & Co. .....Buffalo.
Berry Bros., Ltd. .....Detroit.
Day's Varnish & Dryer Co. .....Cleveland.
Mohawk Paint & Chemical Co.....New York.
New Jersey Zinc Co. .....New York.
Topky Brothers .....Ashtabula, O.
Upson-Walton Co. .....Cleveland.

PATENT ATTORNEYS.

Thurston & Bates .....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PIPE—BRASS AND COPPER, IRON PIPE SIZE.

Waterbury Brass Co.....New York.

PIPE, WROUGHT IRON.

Bourne-Fuller Co .....Cleveland.
Crane Co .....Chicago.
Macbeth Iron Co.....Cleveland.

PLANING MILL MACHINERY.

Atlantic Works, Inc. .....Philadelphia.

PLATE BENDING AND PLANING MACHINES.

Wood & Co., R. D. .....Philadelphia.

PLUMBING, MARINE.

Mott, J. L., Iron Works .....New York.
Reilly Repair & Supply Co., James....New York.
Sands, Alfred B. & Son .....New York.

PNEUMATIC TOOLS.

Allen, John F., ... New York.
Chicago Pneumatic Tool Co. .....Chicago.
Railway Appliances Co .....Chicago.

POLISH FOR METALS.

Bertram's Oil Polish Co.....Boston.

POWER DOORS AND HATCHES.

"Long-Arm" System Co. .....Cleveland.

PRESSURE REGULATORS.

Kieley & Mueller .....New York
Ross Valve Co. .....Troy, N. Y.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

PROPELLER WHEELS.

American Ship Building Co. .....Cleveland
Atlantic Works .....East Boston, Mass.
Baltimore Ship Building & Dry Dock Co. Baltimore.
Bath Iron Works, Ltd. .....Bath, Me.
Cramp, Wm. & Sons.....Philadelphia.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Hyde Windlass Co. .....Bath, Me.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co. .....East Boston, Mass.
Macbeth Iron Co.....Cleveland.
MacKinnon Mfg. Co. .....Bay City, Mich.
Maryland Steel Co. .....Sparrow's Point, Md.
Milwaukee Dry Dock Co. .....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Phila.
Newport News Ship Bldg. Co...Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Phosphor Bronze Smelting Co., Ltd...Philadelphia.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roelker, H. B. .....New York.
Sheriffs Mfg. Co. .....Milwaukee.
Superior Ship Building Co.....Superior, Wis.
Thropp & Sons Co., J. E. .....Trenton, N. J.
Trigg, Wm. R. Co. .....Richmond, Va.
Trout, H. G. .....Buffalo.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co. .....New York.
Clyde Machine Works .....Chicago.
Great Lakes Engineering Works.....Detroit.
Kingsford Foundry & Machine Wks. Oswego, N. Y.
Long Arm System Co. .....Cleveland.

PUNCHES, RIVETERS, SHEARS.

Chicago Pneumatic Tool Co. .....Chicago.

REFRIGERATING APPARATUS.

Roelker, H. B. .....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register .....Cleveland.
Record of American & Foreign Shipping.New York.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co. New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co. .....Cleveland.

RANGES.

Russell & Watson .....Buffalo.

RIVETS—BRASS AND COPPER.

Waterbury Brass Co.....New York.

RUBBER INSULATED WIRES.

Roebling's Sons, Jno. A...New York and Cleveland.

SAFETY VALVES.

American Steam Gauge Co. .....Boston.
Ashton Valve Co.....Boston.
Hayden Mfg. Co., N. L.....Columbus, O.
Lunkenheimer Co. .....Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co. .....Buffalo.
Upson-Walton Co. .....Cleveland.
Wilson & Silsby .....Boston.

SALVAGE COMPANIES.

See Wrecking Companies.

SCHOOLS—NAUTICAL, ENGINEERING.

Chicago Nautical School .....Chicago.

SEARCH LIGHTS.

Elwell-Parker Electric Co. .....Cleveland.
General Electric Co. .....Schenectady, N. Y.
Seidler-Miner Electric Co. .....Detroit.
Westinghouse Electric & Mfg. Co....Pittsburg, Pa.

SHEARS.

See Punches, Rivets, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co. .....Cleveland.

SHIP BUILDERS.

American Ship Building Co. .....Cleveland.
Atlantic Works .....East Boston, Mass.
Baltimore Ship Building & Dry Dock Co..Baltimore.
Bath Iron Works, Ltd.....Bath, Me.
Buffalo Dry Dock Co. .....Buffalo.
Columbia Iron Works.....Port Huron.
Cramp, Wm. & Sons.....Philadelphia.
Craig Ship Building Co. .....Toledo, O.
Chicago Ship Building Co.....Chicago.
Detroit Ship Building Co. .....Detroit.
Fore River Ship & Engine Co. .....Quincy, Mass.
Great Lakes Engineering Works.....Detroit.
Jenks Ship Building Co. .....Port Huron, Mich.
Lockwood Mfg. Co.....East Boston, Mass.
Manitowoc Dry Dock Co.....Manitowoc, Wis.
Marine Construction & Dry Dock Co.....
.....Mariner's Harbor, S. I., N. Y.
Maryland Steel Co .....Sparrow's Point, Md.
Milwaukee Dry Dock Co.....Milwaukee.
Moran Bros. Co. .....Seattle, Wash.
Neafie & Levy Ship & Engine Bldg. Co.....Phila.
Newport News Ship Bldg. Co....Newport News, Va.
Nixon, Lewis .....Elizabeth, N. J.
Pusey & Jones Co. .....Wilmington, Del.
Risdon Iron Works .....San Francisco.
Roach's Ship Yard .....Chester, Pa.
Smith & Son, Abram .....Algonac, Mich.
Trigg, Wm. R. Co. .....Richmond, Va.
Warrington Iron Works .....Chicago.
Willard, Chas. P. & Co. .....Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co. .....Buffalo.
Moran Bros. Co. .....Seattle, Wash.
Reilly Repair & Supply Co., James....New York.
Upson-Walton Co. .....Cleveland.

SHIP LANTERNS AND LAMPS.

Helvig, H. A. J.....New York.
Page Bros. & Co.....New York.
Russell & Watson.....Buffalo.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co. .....Jersey City, N. J.

SPARS—LARGE SIZES.

Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW, OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Elwell, Jas. W. & Co.....New York.
Holmes, Samuel.....New York.
King, Rufus S.....New York.
McCarthy, T. R.....Montreal, Can.
Newman, R. L.....New York.
Weeks, F. H.....New York.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
Erie & Western Trans. Co. .....Buffalo.
International Nav. Co.....Philadelphia.
Pere Marquette R. R. & S. S. Line.....Milwaukee.
Red Star Line.....New York.

STEEL CASTINGS.

Seaboard Steel Casting Co.....Chester, Pa.
Macbeth Iron Co.....Cleveland.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
Chase Machine Co. .....Cleveland.
Dake Engine Co.....Grand Haven, Mich.
Detroit Shipbuilding Co.....Detroit.
Electro-Dynamic Co.....Philadelphia.
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.
Queen City Engineering Co.....Buffalo.
Sheriff Mnfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.

Brown, W. W.....Cleveland.
Fahey & Co.....Cleveland.

SUBMARINE DIVING APPARATUS

Morse & Son, A. J.....Boston.
Schrader's Son, A.....New York.

SURVEYORS, MARINE.

Gaskin, Edward.....Buffalo.
Newman, R. L.....New York.
See, Horace.....New York.
Wood, W. J.....Chicago.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
Pittsburg Testing Laboratory, Ltd.....Pittsburg.

TILING, INTERLOCKING RUBBER.

New York Belting & Packing Co.....New York.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Allen, John F.....New York.
Chicago Pneumatic Tool Co.....Chicago.
Railway Appliances Co .....Chicago.
Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
Chase Machine Co.....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

TRAPS, STEAM..

Kieley & Mueller.....New York.

TRUCKS.

Boston & Lockport Block Co..... .....Boston.

TUBING, SEAMLESS.

National Tube Co.....Pittsburg.
Waterbury Brass Co.....New York.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Crane Co. .....Chicago.
Farnan Brass Works .....Cleveland.
Hayden Mfg. Co., N. L.....Columbus, O.
Jenkins Bros.....New York.
Kieley & Mueller.....New York.
Lunkenheimer Co.....Cincinnati.
Ross Valve Co. .....Troy, N. Y.

VALVES FOR WATER AND GAS.

Wood & Co., R. D.....Philadelphia.
Ross Valve Co. .....Troy, N. Y.

VARNISHES.

Berry Brothers, Ltd.....Detroit.
New Jersey Zinc Co.....New York.
Also Ship Chandlers.

VESSEL CASTINGS.

American Ship Building Co.....Cleveland.
Macbeth Iron Co.....Cleveland.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
Brown & Co.....Buffalo.
Brown, W. W.....Cleveland.
Dunham, R J..... .....Chicago.
Elwell, Jas. W. & Co.....New York.
Elphicke, C. W & Co.....Chicago.
Hall & Root.....Buffalo.
Helm & Co., D. T. .....Duluth.
Hawgood & Co., W. A.....Cleveland.
Holmes, Samuel.....New York.
Hutchinson & Co.....Cleveland.
King, Rufus S.....New York.
McCarthy, T. R.....Montreal.
Newman, R. L.....New York.
Mitchell & Co.....Cleveland.
Richardson, W. C.....Cleveland.
Sullivan, D. & Co.....Chicago.
Weeks, F. H.....New York.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co. .....Buffalo.
Sturtevant, B. F. Co.....Boston.

WIRE—BRASS AND COPPER.

Waterbury Brass Co.....New York.

WIRE ROPE AND WIRE ROPE FITTINGS.

Baker, H. H. & Co.....Buffalo.
DeGrauw, Aymar & Co. .....New York
Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co. .....Boston.
Ashton Valve Co. .....Boston.
Farnan Brass Works .....Cleveland.
Lunkenheimer Co.....Cincinnati.

WHITE METAL—SHEETS, RODS AND WIRE.

Waterbury Brass Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
American Ship Building Co. .....Cleveland
Hyde Windlass Co.....Bath, Me.
Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Atlantic Works, Inc.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co....Kingston, Ont.
Midland Towing & Wrecking Co., Ltd.Midland, Ont.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.
Marine Construction & Dry Dock Co. ...New York.
Truscott Boat Mfg. Co. .....St. Joseph, Mich.
Warrington Iron Works.....Chicago.
Willard, Chas. P. & Co.....Chicago.

YAWLS.

Drein, Thos. & Son.....Wilmington, Del.
Lane & DeGroot.....Long Island City, N. Y.

ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW AND MARINE RECORD.

The star (*) indicates that the advertisement appears alternate weeks. For addresses see advertisements on pages noted.

*Allen, John F. 11
Allen, Joseph 3
Almy Water Tube Boiler Co.... 15
American Injector Co 10
American Line 13
American Metallic Packing Co.... 11
American Ship Building Co..... 1
American Ship Masters Ass'n... 6
American Ship Windlass Co..... 2
American Steam Gauge Co..... 1
*American Steam Packing Co.....35
Anchor Line 45
Armstrong Cork Co..... 48
Ashton Valve Co..... 16
Atlantic Works 5
*Atlantic Works, Inc..... 11

Babcock & Wilcox Co..... 15
Bacon, H. H..... 40
Baldt Anchor Line 9
Baltimore Ship Building & Dry Dock Co. 5
Baker, Howard H. & Co..... 48
Bartlett & Snow Co., C. O..... 2
Bath Iron Works, Ltd..... 1
Bertram's Oil Polish Co..... 1
Berry Brothers, Ltd..... 10
Blake, Geo. F., Mfg. Co..... 9
*Bliss, John & Co..... 13
*Bloomsburg & Co., H..... 9
Boland, J. J..... 40
*Boston & Lockport Block Co.... 48
Bourne-Fuller Co. 16
Bowers, L. M. & Co..... 9
Bowler & Co., Geo. H..... 37
*Boyer's, L. Sons 48
Brown, Harvey L. 40
Brown & Co. 40
Brown Hoisting Machinery Co., Inc. 2
Brown, W. W. 40
Buffalo Dry Dock Co..... 46
Buffalo Forge Co..... 16

Castner, Curran & Bullitt..... 39
Chase Machine Co. 8
*Chelsea Clock Co..... 3
Chicago & N. W. Ry. 45
Chicago Pneumatic Tool Co..... 16
Chicago Ship Building Co..... 46
Cleveland City Forge & Iron Co.. 48
Cleveland Trust Co. 36
Columbia Iron Works 5
Continental Iron Works 2
Cory, Chas. & Son 12
*Craig Ship Building Co..... 13
Cramp, Wm. & Sons, S. & E. B. Co. 1
*Crandall & Son, H. I. 11
Crane Co. 4-7

Dake Engine Co. 12
Dearborn Drug & Chemical Wks. 13
Dearing Water-Tube Boiler Co.. 32
DeGrauw, Aymar & Co..... 9
Delauney, Belleville & Co..... 30
Delaware River Iron S. B. & E. Works. 5
Detroit Ship Building Co..... 1
Dixon Crucible Co., Joseph..... 12
Donnelly Salvage & Wrecking Co. 7
Drein, Thos. & Son..... 4
Dunham, R. J. 40

Electro-Dynamic Co 1
Elphicke, C. W. & Co..... 40
Elwell, Jas. W., & Co..... 40
Elwell-Parker Electric Co. 2
Erie & Western Trans. Co. 45

Fahey & Co. 12
Falls Hollow Staybolt Co..... 4
Farnan Brass Works 12
Federal Trust Co. 36
Fix's S., Sons 37
Fletcher, W. & A. Co..... 5
Fogg, M. W. 38
Fore River Ship & Engine Co..... 5
Forest City Boiler Co..... 47

Garrett-Cromwell Engineering Co. 3
Gaskin, Edward 41
General Electric Co. 16
Gilchrist, Albert J. 40
Goulder, Holding & Masten..... 40
Graham Coal & Coke Co..... 38
Great Lakes Engineering Works. 34
Great Lakes Register 7

Hall & Root 40
Hanna, M. A. & Co..... 38
Hardy, Wm. A. 14
Hawgood & Co., W. A..... 40
Hayden Mfg. Co., N. L..... 37
Helm & Co., D. T..... 40
Helvig, H. A. J..... 4
Herriman, F. D. 7
Holmes, Samuel 40
Hoyt, Dustin & Kelley 40
Hunt, Robert W. & Co..... 41
Hutchinson & Co. 40
Hyde Windlass Co. 48

Insurance Co. of North America.. 7
International Navigation Co. 13

Jenkins Brothers 3-12
Jenks Ship Building Co..... 47
Johns-Manville Co., H. W..... 31

Kahnweiler's Sons, David..... 4
Katzenstein, L. & Co..... 3
Kent Machine Works 37
Kidd, Joseph 40
Kieley & Mueller..... 3
Kingsford Foundry & Machine Works 13
King, Rufus S. 40
Kremer, C. E. 40

Lake Erie Boiler Works..... 14
Lane & DeGroot 4
*Learmonth, Robert 3
Lidgerwood Mfg. Co. 6
Lockwood Mfg. Co. 5
Logan, Robert 41
"Long-Arm" System Co. 1
L. S. & M. S. Ry..... 45
Lunkenheimer Co. 12

McCarthy, T. R. 40
McCurdy, Geo. L. 7
McCutcheon, C. H. 11
McPherson, Clark, Campbell & Jarvis 40
Macbeth Iron Co. 48
MacDonald, Ray G. 40
MacKinnon Mfg. Co. 8
MacLean Hydraulic Signal Co .. 6
Manitowoc Dry Dock Co. 5
Marine Construction & Dry Dock Co. 4
*Marine Iron Co. 38
Martin-Barriss Co. 9
Maryland Steel Co. 5
Midland Towing & Wrecking Co., Ltd. 48
Milwaukee Dry Dock Co. 46
Mitchell & Co. 40
Mohawk Paint & Chemical Co... 7
*Moran Bros. Co. 47
Morse & Son, A. J..... 33
Mosher, Chas. D. 41
*Mott, J. L., Iron Works..... 13

National Tube Co. 14
Neafie & Levy Co. 5
Newman, R. L. 40
Newport News Ship Building & Dry Dock Co. 5
New Jersey Zinc Co. 7
New York Belting & Packing Co. 10
Nicholson Ship Log Co..... 3
Nixon, Lewis 4
North River Iron Works 5

Peck, Chas. E. & W. F..... 7
Penberthy Injector Co..... 10
Pere Marquette R. R. & S. S. Line 45
Phosphor Bronze Smelting Co. Ltd. 14
Pickands, Mather & Co. 38
Pinney & Warner 40
Pittsburg Coal Co. 39
Pittsburg Testing Laboratory, Ltd. 41
Pittsburg White Metal Co..... 33
Potter, J. D..... 3
Powell, Ambrose V. 40
Pryor Patent Excavator Tooth Co..
Pusey & Jones Co. 5

Queen City Engineering Co. 12

Railway Appliances Co..... 33
Record of American & Foreign Shipping 6
Red Star Line 13
Richardson, W. C. 40
*Reilly Repair & Supply Co., Jas. 9
Risdon Iron Works 5
*Ritchie & Sons, E. S..... 13
Roach's Ship Yard 5
Roberts Water Tube Boiler Co.. 15
Rochester & Pittsburg Coal & Iron Co. 39
Roelker, H. B. 5
Ross Valve Co. 12
Russell & Watson 6

Sadler, Perkins & Field..... 41
Safety Car Heating & Lighting Co. 3
Sands, Alfred B. & Son..... 37
Scherzer Rolling Lift Bridge Co. 9
Schrader's Sons, A. 1
Schwencke, Kirk & Co. 41
Seaboard Steel Casting Co. 32
See, Horace 41
Seidler-Miner Electric Co. 6
Shaw, Warren, Cady & Oakes.... 40
Sheriffs Mfg. Co. 8
Shipowners Dry Dock Co. 16
*Smith & Son, Abram 38
Smith Co., L. P. & J. A..... 8
Smith Premier Typewriter Co.....37
Smith, Stanley B. & Co..... 39
Smooth-On Mfg. Co. 9
Spencer, H. R. 40
Standard Chain Co. 4
*Standard Oil Co. 14
Standard Releasing Hook Co. .. 38
Stirling Co. 15
Stratford Oakum Co., Geo. 6
Sturtevant, B. F. Co. 48
Sullivan & Co. 40
*Superior Iron Works 8
Superior Ship Building Co..... 46

Taylor Water Tube Boiler Co... 15
Thropp, J. E. & Sons Co..... 12
Thurston & Bates 41
*Topky Bros. 12
Trigg Co., Wm. R. 4
Trout, H. G. 8
Truscott Boat Mfg. Co. 38

Union Machine & Boiler Co..... 38
United Marine Mfg. & Supply Co. 31
Upson-Walton Co. 43
U. S. Metallic Packing Co..... 43

Walker, Thomas & Son..... 3
Ward Machine Co. 47
Warrington Iron Works 38
Waterbury Brass Co. 43
*Watson-Stillman Co. 47
Webster, Camp & Lane Co..... 2
Weeks, F. H. 40
Westinghouse Electric & Mfg. Co. 6
White, Johnson, McCaslin & Cannon 40
*Willard, Chas. P. & Co..... 13
Wood, W. J. 40

Youghiogheny & Lehigh Coal Co.. 39

PERE MARQUETTE
R.R. & STEAMSHIP LINE

Chicago, Milwaukee, Manitowoc, and Grand Rapids, Saginaw, Port Huron, Detroit, Toledo

H. F. MOELLER, Gen'l Passenger Agent
Send for folder. DETROIT, MICH

The Erie & West. Transportation Co.
ANCHOR LINE.

PASSENGER SERVICE Steamers.

India. China. Japan.

PORTS OF CALL.

Buffalo. Erie. Cleveland.
Detroit. Mackinac Island.
Sault Ste. Marie. Marquette. Houghton.
Hancock. Duluth.

FREIGHT SERVICE Steamers.

Alaska. Codorus. Mahoning.
Schuylkill. Conestoga. Clarion.
Delaware. Juniata. Lehigh.
Lycoming. Susquehanna. Wissahickon.
Conemaugh.

PORTS OF CALL.

Buffalo. Erie. Cleveland.
Detroit. Sault Ste. Marie. Marquette.
Houghton. Hancock. Duluth.
W. Superior Chicago. Milwaukee.

CHAS. E. MARKHAM, General Passenger Agent, Buffalo, N. Y.
E. T. EVANS, Western Manager, Buffalo, N. Y.

LAKE SHORE & MICHIGAN SOUTHERN RY.

	Arrive from West	Depart East.
Eastward.		
No. 18, Southwestern Lim	.....	1:50am
No. 22, Lake Shore Lim...	*2:15am	*2:20am
No. 20, Chi & Cleve Ex....	*7:20am	.....
No. 28, N Y & Bost Ex....	*7:40am	*8:00am
No. 40, Toledo & Buff Ac.	†10:00am	†10:40am
No. 32, Fast Mail	*11:25am	*11:30am
No. 44, Ac via Sandusky..	†1:40pm	..
No. 46, Southwestern Ex.	.....	*3:00pm
No. 106, Conneaut Accom	.....	†4:30pm
No. 6, Lim Fast Mail....	*5:40pm	*5:45pm
No. 26, 20th Cent L.m....	*7:40pm	*7:43pm
No. 10, C., N Y & B Sp....	*7:30pm	*7:50pm
No. 16, New Eng Ex.....	*10:30pm	*10:35pm
No. 2, Day Express.....	†9:10pm	†9.25pm
No. 126, Norwalk Accom.	†7:50am	.....

	Arrive from East.	Depart West.
Westward.		
No. 11, Southwestern Lim	*3:25am	.....
No. 7, Day Express.....	.....	†6:10am
No. 15, Bost & Chi Sp.....	*3:10am	*3:15am
No. 19, Lake Shore Lim..	*7:15am	*7:20am
No. 23, Western Express.	*10:30am	*10:35am
No. 33, Southern Express	*12:25pm	....
No. 133, Cleve & Det Ex..	.....	*12:45pm
No. 47, Accomodation.....	†11.20am	†3:00pm
No. 141, Sandusky Accom.	.....	†3:10pm
No. 43, Fast Mail	*4:35pm	*4:40pm
No. 127, Norwalk Accom..	.....	†5:10pm
No. 37, Pacific Express...	*7:00pm	*7:20pm
No 3, Fast Mail Lim.....	*10:50pm	*10:55pm
No. 115, Conneaut Accom.	*8:30am	.....

*Daily. †Except Sunday.
Trains Nos. 23, 28 and 37 run via Erie Station.
City Ticket Office, 237 Superior St.

MANUFACTURERS

Contemplating establishing plants in the West should take advantage of a location on

THE NORTH-WESTERN LINE

Chicago & North-Western Ry.

which reaches the famous

WATER POWERS, COAL FIELDS, IRON ORE RANGES, HARD AND SOFT LUMBER DISTRICTS

of the West and Northwest, and affords the best means of transportation to the markets of the world.

FOR FURTHER PARTICULARS APPLY TO

MARVIN HUGHITT, Jr., *Freight Traffic Mgr.*, E. D. BRIGHAM, *Gen'l Freight Agent*, CHICAGO.

WILLIAM L. BROWN, President. B. W. WELLS, Vice-Pres. O. R. SINCLAIR, Sec'y & Treas. ALFRED G. SMITH, Gen'l Supt.

CHICAGO SHIP BUILDING COMPANY,

LONG DISTANCE TELEPHONES.
Ship Yard and Dry Dock Office, "South Chicago 40."
Chicago Office, 1125 Rookery, "Harrison," 1207.

Steel Ship Builders and Dry Dock Proprietors.

Dry Dock and Yards: 101st St. and Calumet River, - - - - CHICAGO, ILL.

MILWAUKEE DRY DOCK COMPANY

MILWAUKEE, WISCONSIN

SHIP REPAIRS

OF ALL KINDS

Two Ship Yards offer every Facility for the Repair of both Steel and Wooden Vessels

South Yard Dock....
is 450 ft. long on keel blocks; 460 feet over all; 56 feet width of gate, and 16 feet over sill.

West Yard Dock....
312 feet on keel blocks; 45 feet width of gate, and 12 feet over sill.

RUDDER PIT IN EACH DOCK.
ELECTRIC LIGHTS FOR NIGHT WORK.

Main Office at **SOUTH YARD,**
Foot of Washington St.

EDWARD SMITH, President. WILLIAM KNIGHT, Asst. Sec'y & Treas. W. T. NEVINS, Superintendent.

THE BUFFALO DRY DOCK CO.

GANSON STREET AND BUFFALO RIVER.

Operating Four Docks, Sixty-ton Shear Legs, and in every way Equipped

WITH MODERN PLANT FOR

The Building and Economical Repairs of

STEEL AND WOODEN SHIPS

LONG DISTANCE TELEPHONE CONNECTIONS:

Office Telephone, 515 Seneca. President's Telephone, 279 Seneca, Office. President's Telephone, 209 Bryant, Residence.
Asst. Sec'y & Treas., Telephone, 609 Bryant, Residence. Superintendent, Telephone, 108 South, Residence.

THE SUPERIOR SHIPBUILDING COMPANY

Dry Dock and Repairs of All Kinds	**SHIP AND ENGINE BUILDERS**	**Two Largest Dry Docks On the Lakes**

Large Stock of Material Always on Hand for Repairing Wooden and Metal Ships.

Repairing Promptly Attended to, Night or Day.

West Superior, Wis.

The Jenks Ship Building Co.

STEEL SHIP BUILDERS,

MARINE ENGINES AND BOILERS.

Prompt Attention Given to Repairs of all Kinds on Ships, Engines and Boilers.

OFFICE AND MACHINE SHOPS AT FOURTH STREET.

YARDS AT FOOT OF LINCOLN AVENUE.

PORT HURON, - - MICHIGAN.

MORAN BROS. COMPANY

SEATTLE, WASHINGTON

SHIP AND ENGINE BUILDERS

STEEL AND WOOD VESSELS, STEAM OR SAIL

FOR OCEAN, SOUND AND RIVER SERVICE

FOUNDRY, MACHINE, BOILER AND FORGE SHOPS

LARGEST TOOLS AND EQUAL TO ANY REQUIREMENT

HEAVY FORGINGS A SPECIALTY

DRY DOCK AND MARINE RAILWAY

Two-Section balanced floating dry dock, 400 ft. long, 60 ft. between towers; patent steel wedge keel blocks; 12,000 tons displacement.

CAPACITY OF MARINE RAILWAY 1500 TONS

SHIP CHANDLERY, ENGINEERS' SUPPLIES

SAW AND PLANING MILL

CAPACITY: TIMBER, 48 INCHES SQUARE, 125 FEET LONG

Including every description of ROUGH, DRESSED or KILN DRIED

YELLOW FIR, RED CEDAR OR SPRUCE

We make a specialty of long and large timber and can DRESS FOUR SIDES 20 x 30 INCHES.

SPARS THE LONGEST, LARGEST, CLEAREST AND BEST IN THE WORLD; ROUGH OR HEWN.

PILES OR TIMBER OF ANY DESCRIPTION.

CARS FROM ALL TRANSCONTINENTAL ROADS

ENTER OUR YARDS AND DOCKS

DOCK SHIPMENTS TO ALL PARTS OF THE WORLD

ELECTRIC CRANE Capacity to transfer 75 tons from car to vessel

WE INVITE CORRESPONDENCE

THE ONLY

MARINE DIRECTORY

BLUE BOOK

—OF—

AMERICAN SHIPPING

NOW IN ITS SEVENTH YEAR.

1902 EDITION JUST FROM THE PRESS.

Every ship builder, marine engine and boiler builder, ship owner, naval architect, marine engineer, and, in fact, everyone in the United States whose business is with ships is mentioned in the Blue Book and his address given. The aim has been to make it a complete working directory of the marine trade of the United States. With its aid you may reach anyone connected with this great branch of industry.

Its statistics of waterborne commerce are thoroughly reliable. The section devoted to the commerce of the great lakes with its iron mines and their output, its coal trade and dock facilities, its grain trade and elevators, its ships and their owners, is very thorough and absolutely authentic. . . . . .

MARINE REVIEW PUB. CO.

39-40-41 WADE BLDG., CLEVELAND, O.

SOME MEN PAY

$10,000 for an expert to manage their advertising.

There are others who pay **$5.00** for an annual subscription to PRINTERS' INK and learn what all the other advertisers are thinking about, but even these are not the extremes reached.

There are men who lose over **$100,000** a year by doing neither one.

FOR SAMPLE COPY SEND 10 CENTS TO

PRINTERS' INK,

No. 10 Spruce St., NEW YORK CITY.

WARD MACHINE COMPANY

GENERAL MACHINISTS

C. E. WARD, Mgr.

MARINE WORK A SPECIALTY.

19 Michigan St. Cleveland, O.

John D. Gilchrist, Pres. John Marron, Sec'y.
John A. Flajole, Gen'l Mgr.

THE FOREST CITY BOILER CO.

Marine Work a Specialty.

264 Merwin St. Tel. Main 1886

CLEVELAND, OHIO.

STEEL SHIPS.

THEIR CONSTRUCTION AND MAINTENANCE.

A manual for ship builders, ship superintendents, students and marine engineers.

By Thomas Walton.

Price $5.50. THE MARINE REVIEW PUB. CO., Cleveland.

PROPELLER WHEELS
SOLID AND SECTIONAL
AETNA GRATE BARS,
TIMBERHEADS, CHOCKS, ETC.

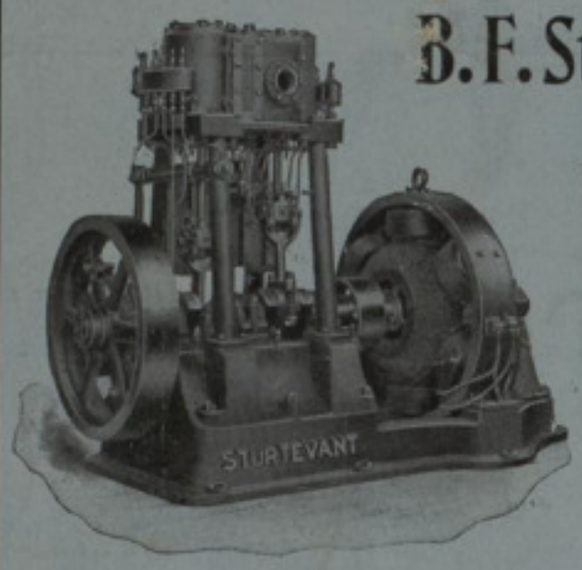
THE MACBETH IRON CO.
57 WEST CENTER ST. CLEVELAND, OHIO

ENGINEERS, FOUNDERS AND MACHINISTS.
HEAVY FORGINGS
ENGINE REPAIRS.

MARINE LIGHTING SETS.

We Build Both
Engine and Generator.

Send for Bulletin G.

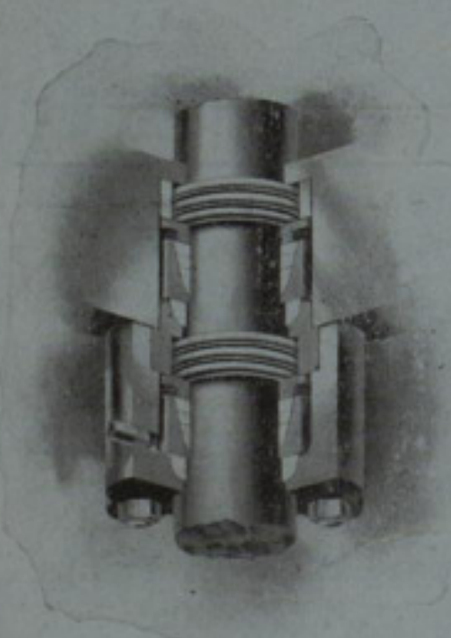


B. F. Sturtevant Co.

BOSTON, MASS.

NEW YORK.
PHILADELPHIA.
CHICAGO.
LONDON.

(8)



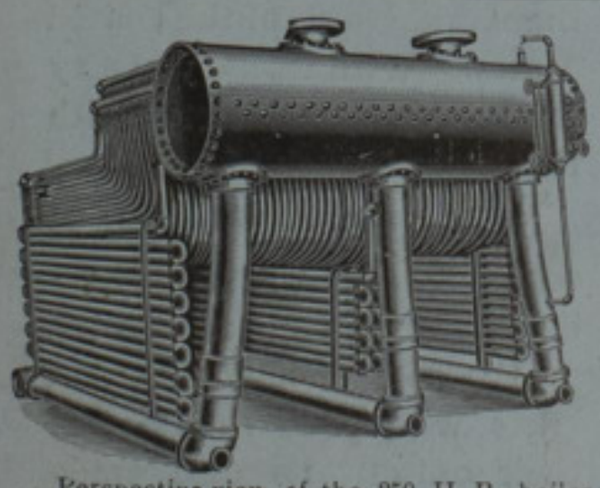
Class No. 1 Packing.

United States Metallic Packing Co.

427 NORTH 13TH ST.
PHILADELPHIA, PENN.

SEND FOR CATALOG

CHICAGO
509 Great Northern Building



Perspective view of the 250 H. P. boiler built for the steam freighter "Clara," having 6 ft. space and 8 ft. length; 34.4 sq. ft. of grate area and 1,900 sq. ft. heating surface; weight of boiler and water, 14,000 lbs. Replaced a return tubular boiler, thereby saving in dead-weight of boiler and water, 16½ tons. The Clara now has 14 in. less draft and an increased earning capacity of $10 per day.

Boyer Sectional Water Tube Boilers are of an entire new design, are simplest in construction, are accessible to all parts, are rapid steamers with short circulation, have low center of gravity, have no joints in the fire, have no dead ends, occupy less space in width, length and height than any other, are easily fired, can be repaired or set up by any ordinary mechanic, do not require a brick casing, and are shipped whole or knocked down into packages for transportation by man or beast.

Kindly mention this paper.

L. BOYER'S SONS,

90 Water Street, : NEW YORK, N. Y.

State of Ohio, County of Cuyahoga, } SS.

Good Rope vs. Cheap Rope.

TRIAL NOW ON.

Jurors: **All Vessel Men.**

THE UPSON-WALTON CO.

Are on the side of Good Rope.

What will be your Verdict! . . . . . .

THE MOST COMPLETE STOCK

BRASS and COPPER

in Sheets, Tubes, Wire and Rod.

Service Right, Quality Right, Prices Right

Waterbury Brass Co.

122 to 130 Centre St., :: :: :: New York City

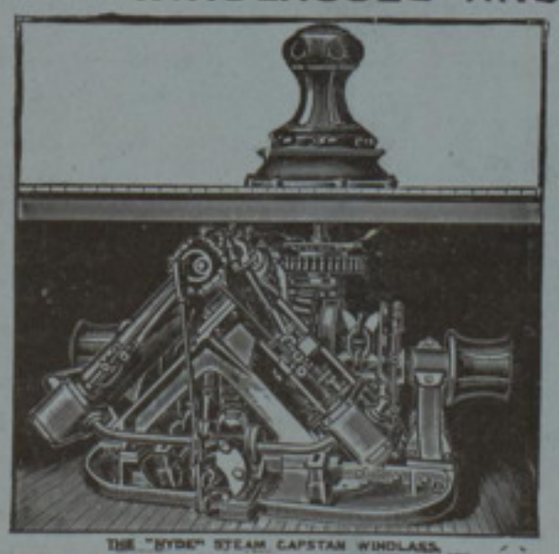
Always have our classified Stock List before you
YOURS FOR THE ASKING

CLEVELAND CITY FORGE & IRON CO.

CLEVELAND, O.

IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

WINDLASSES AND CAPSTANS



The Hyde Steam and Power Windlasses and Capstans are the best in the market.

They have been selected for most of the vessels now building for the Navy Department, Revenue Marine, Light-house Board and United States Coast Survey.

They are being furnished for the majority of the highest class Steam Ships, Merchant Vessels and Yachts now building.

HYDE WINDLASS COMPANY, : BATH MAINE.

LIFE PRESERVERS—BUOYS.

Acme. Solid Cork. Granulated Cork. Each Preserver stamped by U. S. Inspector guaranteeing proper buoyancy. Cork Filled Yacht Fenders. Cork Mooring Buoys. Material and Finish Guaranteed. Orders filled promptly.

ARMSTRONG CORK COMPANY,
Boston. New York. Philadelphia. Pittsburg. Chicago.
St. Louis. Baltimore.

Midland Towing and Wrecking Co., Ltd.

MIDLAND, ONT., CANADA.

JAMES PLAYFAIR, { Pres't and Gen. Mngr.
D. L. WHITE, Vice-President.
J. W. BENSON, Sec'y and Treas.

First-Class Tugs for Wrecking, Raft Towing, Etc. Steam Pumps, Divers, Jacks, Hawsers, Lighters.

---

18 to 26 TERRACE,
BUFFALO, N. Y.

Howard H. Baker & Co., SHIP CHANDLERS AND SAIL MAKERS

MARINE REVIEW

WEEKLY.] AND MARINE RECORD. [ESTABLISHED, 1878.

VOL. XXVII. CLEVELAND, O., MAR. 19, 1903. No. 12.

Improved Bolt Helmet

Established 1844.

A. SCHRADER'S SON,

32 Rose Street, NEW YORK.

Manufacturer of

Submarine Armor and Diving Apparatus.

We carry a complete stock of Dresses, Hose and Repair Sundries.

All orders filled day received. Write for our prices.

THE WM. CRAMP & SONS SHIP AND ENGINE BUILDING COMPANY.

PHILADELPHIA.

SOLE MANUFACTURERS IN AMERICA OF

Parsons Manganese Bronze and Parsons White Brass.

W. L. BROWN, Pres.
R. L. IRELAND, Vice-President.
R. C WETMORE, Sec'y. and Treas.
JAS. C. WALLACE, General Manager.

DRY DOCKS IN CLEVELAND.
No. 1, foot Weddell St., 440 ft. x 50 ft. x 16 ft.
No. 2, foot Weddell St., 300 ft. x 55 ft. x 13 ft.
No. 3, Elm St., 340 ft. x 50 ft. x 13 ft.
Dry Dock at Lorain, 560 ft by 60 ft. by 17 ft.

The American Ship Building Co.

OFFICE, 120 VIADUCT, CLEVELAND, O.

STEEL SHIPS

Marine and Stationary Engines.
Boilers and Auxiliary Machinery.

Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, as applied to boilers, giving increased power and great economy.

Prompt Attention Given to Ship Repairs of all Kinds.

WORKS AT CLEVELAND AND LORAIN.

EDWARD W. HYDE, Pres. H. H. McCARTY, Treas.
JOHN S. HYDE, Vice-Pres. and Gen. Supt.

BATH IRON WORKS, Ltd.

Ship Builders and Engineers.

BATH, MAINE.

The ELECTRO-DYNAMIC CO.

212 to 226 IONIC STREET : : : PHILADELPHIA, PENNA.

CABLE ADDRESS, :: :: :: :: :: :: EDCO. A. B. C. CODE.

— MANUFACTURERS OF —

DYNAMOS, MOTORS, KNIFE SWITCHES, ELECTRICAL STEERING GEARS, ENGINE ROOM TELEGRAPHS, REVOLUTION INDICATORS, and MARINE SPECIALTIES

THE "LONG-ARM" SYSTEM CO., CLEVELAND, O., U. S. A.
ENGINEERS AND MANUFACTURERS

STANDARD INTERCHANGEABLE SHIP--FITTINGS.

Safety, Electric POWER-DOORS and HATCHES, operated on the "Long-Arm" System.

Small, high and low-duty, three-Cylinder AIR COMPRESSORS (light, compact, vertical, electric drive).

Seamless, steel flasks, leather packings and special valves.

Water-tight Swing Doors, Sliding Doors and Ship Manholes.

Air Ports, Dead Lights, Deck Lights, Hand Pumps and Magazine Lights.

High-grade electric motors, controllers, motor starters and junction boxes.

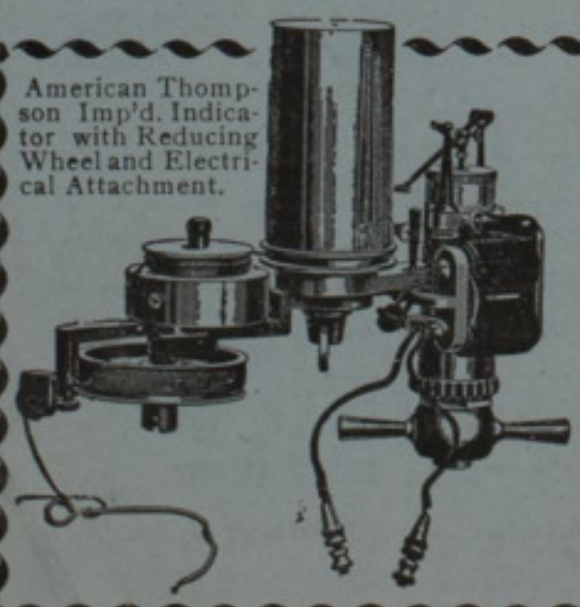
ALEXANDER McVITTIE, President and Manager.
WILLIAM C. McMILLAN, Vice-President.
CHARLES B. CALDER, General Superintendent.
M. E. FARR, Secretary and Treasurer.
FRANK E. KIRBY, Consulting Engineer.

DETROIT SHIPBUILDING COMPANY,

SHIP AND ENGINE BUILDERS, DETROIT, MICH.

Sole Owners for the Lakes and Atlantic Coast of the HOWDEN HOT DRAFT SYSTEM as applied to Boilers, giving increased power and great economy.

Steel Ship Yard Located at Wyandotte, Mich.
Wooden Ship Yards and Dry Docks, Foot of Orleans Street, and Foot of Clark Ave., DETROIT, MICH.



American Thompson Imp'd. Indicator with Reducing Wheel and Electrical Attachment.

American Steam Gauge and Valve Mnf'g. Co.

(Original Steam Gauge Co.)
New York, Boston, Chicago,

Manufacturers of Gauges that Gauge, Indicators that Indicate, Pops that Pop. Clocks, Revolution Counters, Whistles and all kinds of Steamship Instruments. Original and only genuine Thompson Indicator. The Indicator that made Indicators famous. Highest award at the Paris Exposition, 1900. The only American Indicator to receive a medal. The gold medal awarded at Pan-American Exposition on Gauges, Pop Valves, Indicators and Engineering Specialties.

Luck for the 20th Century IN . . . BERTRAM'S OIL & PASTE POLISH.

BERTRAM'S OIL AND PASTE POLISH is and has been, for twenty years, the standard of excellence. As a MARINE POLISH, it has no equal.

Every package, except the 3 and 8 oz. cans, contains one of our "20th CENTURY LUCK COINS."

A sample of BERTRAM'S OIL POLISH mailed free of charge, on request.

BERTRAM'S OIL POLISH CO.,
BOSTON, MASS.

THE BROWN HOISTING MACHINERY CO. INCORPORATED

Sole makers of the "Brownhoist" High Speed Cantilever and Gantry Cranes. The most economical cranes for covering large areas in steel works or ship yards.

Machinery For Handling
Structural Work, Marine Plates, etc., in Ship Building Yards.

Coal and Ore Handling Machinery.

Cranes of all Types.
Steam, Electric and Hand Power.

Main Office and Works, CLEVELAND, O., U. S. A.

Eastern Office, 26 Cortlandt St., New York City. Pittsburg Office, Carnegie Building, Pittsburg, Pa. European Office, 39 Victoria St., London, S.W.

"CLAM SHELL" BUCKETS FOR IRON ORE.

HULETT PATENTS

The Webster, Camp & Lane Co.
BUILDERS.

Complete Coal and Ore Handling Plants.

Engineering Office CLEVELAND, O., Main Office & Works AKRON, O.

We have now fitted up three fueling scows which are now in successful operation on the lakes for fueling vessels.

Send for full description.

Questions and Answers for Marine Engineers.
By Theo. Lucas.
Sent postpaid to any address for $2.00.
Marine Review Pub. Co., 39-41 Wade Bldg., Cleveland, O.

GENERATORS ELWELL-PARKER ELECTRIC CO. OF AMERICA MANUFACTURERS GUARANTEES QUALITY CLEVELAND, OHIO. MOTORS

Standard Marine Generating Sets. *Complete Hoisting and Power Plants.*

Established 1857.

AMERICAN SHIP WINDLASS CO.

PROVIDENCE, R. I.

SHIP MACHINERY EMBODYING THE LATEST DESIGNS AND MANY IMPORTANT PATENTED IMPROVEMENTS.

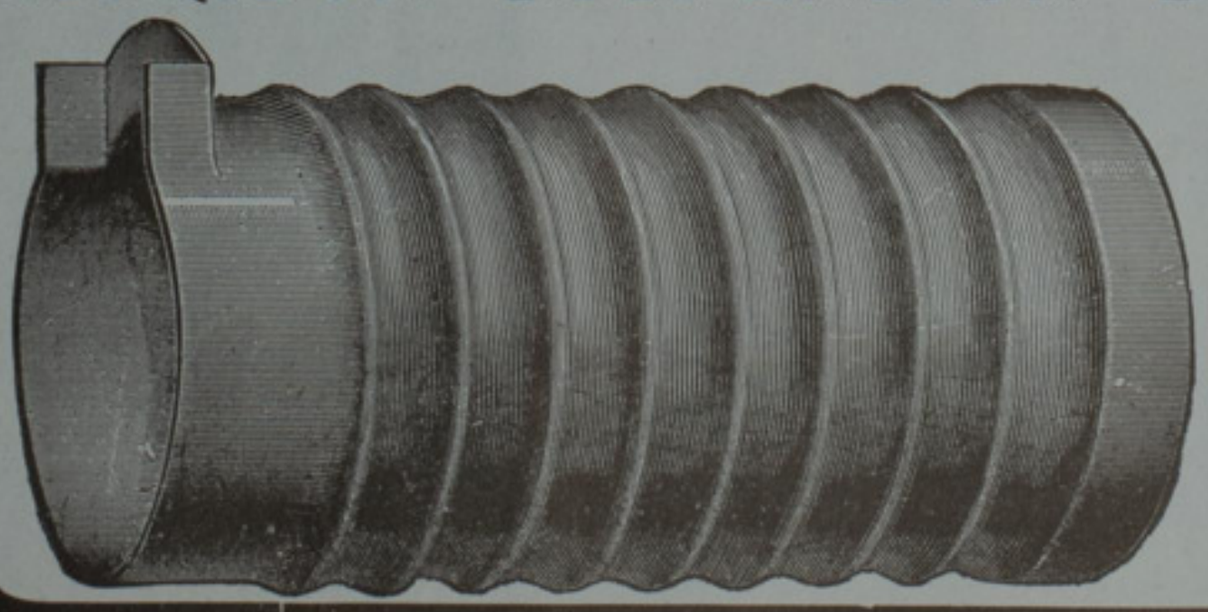
SOLE BUILDERS OF THE

Original and Only Automatic Steam Towing Machine.

SEND FOR ILLUSTRATED CATALOGUE.

P. O. BOX 53. Address: FRANK S. MANTON, President.

MORISON SUSPENSION BOILER FURNACES



FOR LAND AND MARINE BOILERS.

UNIFORM THICKNESS—EASILY CLEANED
UNEXCELLED FOR STRENGTH.

Also Fox Corrugated Furnaces.

MANUFACTURED BY

THE CONTINENTAL IRON WORKS,

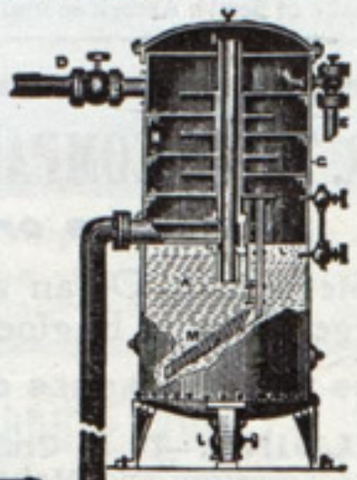
West and Calyer Sts., NEW YORK.

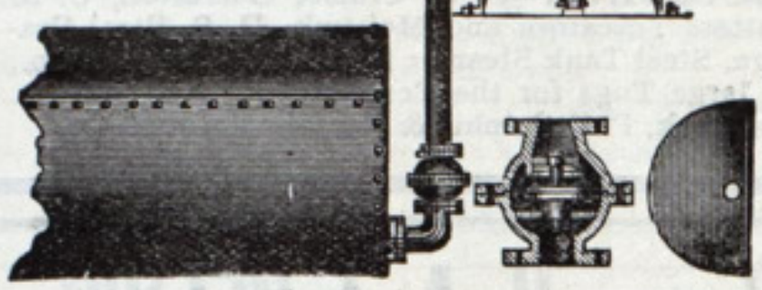
Near 10th and 23d Sts. Ferries. Borough of Brooklyn.

Keep Your Boilers Clean By Using CLEAN WATER.

The BUFFALO" is Warranted to Remove all Sediment and Scale Forming Substance.

THE BUFFALO FEED WATER HEATER AND PURIFIER.



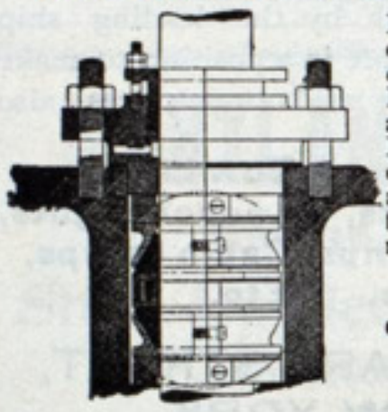


The undersigned has the agency of a number of meritorious steam specialties for use on steam vessels, all of which are guaranteed to be what they are represented, and which he is prepared to furnish at a low rate. I am also prepared to superintend the making of alterations and repairs on steam vessels or power plants, at a reasonable cost, and would respectfully solicit your patronage, to which prompt and personal attention will be given.

ROBERT LEARMONTH, Patentee,

100 WHITE BUILDING, BUFFALO, N. Y.

KATZENSTEIN'S Self-Acting METAL PACKING.



For PISTON RODS, VALVE STEMS, etc., of every description for Steam Engines, Pumps, etc., etc. Adopted and in use by the principal Iron Works and Steamship Companies in this and foreign countries. FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints. For full particulars and reference, address:

L. KATZENSTEIN & CO.,

General Machinists, Brass Finishers, Engineers' Supplies,

358 WEST ST., NEW YORK.

"CONDENSER TUBE PACKINGS."

PATENT APPLIED FOR.

Invented and Manufactured by JOSEPH ALLEN, Collingswood, N. J.

Take the place of lacing. In use all over the world. Saves time, labor and dollars.

STEEL SHIPS

THEIR CONSTRUCTION AND MAINTENANCE.

A manual for ship builders, ship superintendents, students and marine engineers. By Thos. Walton.

Price $5.50.

THE MARINE REVIEW PUB. CO., CLEVELAND.

British Admiralty Charts

The latest Editions of Charts, Plans and Sailing Directions Published by the British Admiralty. Can be obtained from Admiralty Agent by Appointment.

J. D. POTTER,

145 MINORIES, LONDON, ENGLAND.

OFFICIAL CATALOGUE OF CHARTS (380 pages) 1s.

An Abridged Catalogue of Charts of Nautical Books (free on application.)

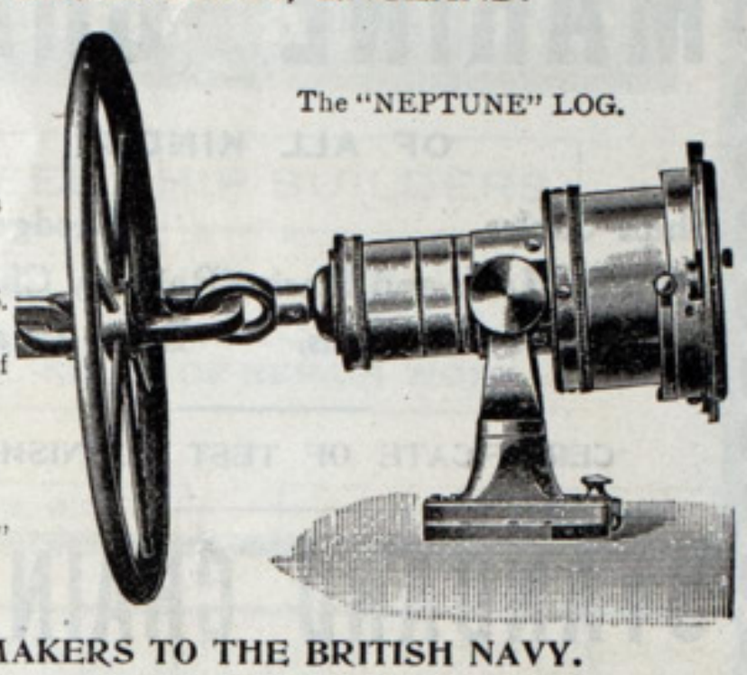
THOMAS WALKER & SON,

BIRMINGHAM, ENGLAND.

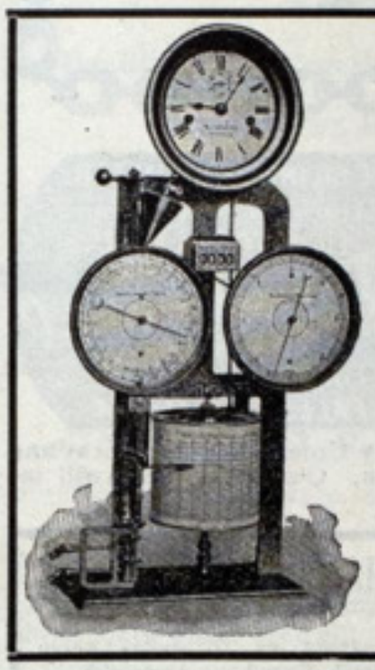
THE "NEPTUNE SHIP-LOG With Ball Bearings for HIGH SPEEDS.

Also makers of the "CHERUB" and "HARPOON" SHIP-LOGS.

The "NEPTUNE" LOG.



MAKERS TO THE BRITISH NAVY.



NICHOLSON PERFECTED SHIP LOG.

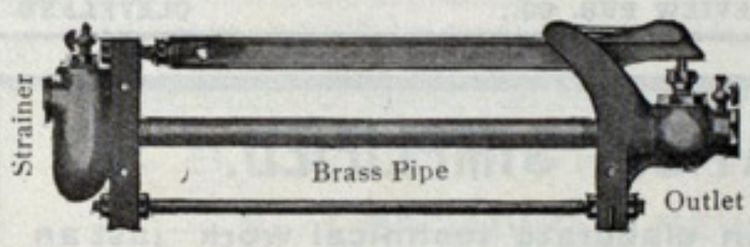
Office White Star Line, Detroit.

Nicholson Ship Log Co.:—Referring to the Nicholson ship log you put in the steamer Tashmoo last spring, I desire to express my appreciation of the good work done by this device. It shows and records at all times the exact speed of the ship, which is very necessary to us in the rivers where our business is conducted. B. S. BAKER, Master.

Manufactured by NICHOLSON SHIP LOG CO.
204 Superior st., Cleveland, Ohio.

EASTERN REPRESENTATIVES
H. E. DANTZEBECHER & CO.
Philadelphia Bourse, Philadelphia

PACIFIC COAST REPRESENTATIVE
W. H. PIERSON,
No. 6 California st., San Francisco



Kieley Expansion Steam Trap
Best Trap made ..for.. **Marine Work.**

Good for any pressure. Valve opens full area.

Also Reducing Valves, Steam Separators and Open Float Traps for Marine Purposes.

Write for Catalogue. SENT ON TRAIL.

KIELEY & MUELLER, 7-17 West Thirteen Street, NEW YORK CITY.

Steel Works and Rolling Mill Engineers

Garrett-Cromwell Engineering Co.

WILLIAM GARRETT, Manager.

New England Building, Cleveland, O.

Pintsch Gas Lighted Buoys

Adopted by the English, German, French, Russian and United States Light House Departments for Channel and Harbor Lighting; over 1000 gas buoys and gas beacons in service.

Burn Continuously

from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

Brilliant and Steady Illumination.
Economical and Reliable in Operation.

Controlled by the SAFETY CAR HEATING and LIGHTING CO.
160 Broadway, New York City.

MARINE CHAIN

OF ALL KINDS.

Ships Cables, Dredge Chains,
Stud Link and Marine Railway Chains,
Steam Shovel Chains, Boom Chains, Etc.

CERTIFICATE OF TEST FURNISHED.

STANDARD CHAIN CO.

PITTSBURGH, PA.

FALLS HOLLOW STAYBOLTS,
ANY SIZE, OUTSIDE OR INSIDE DIAMETER.
AVERAGE LENGTH OF HOLLOW BARS EIGHT TO TEN FEET.
STAYBOLT Co
BOTH HOLLOW AND SOLID,
MADE OF BEST QUALITY DOUBLE REFINED CHARCOAL IRON OR STEEL. CUYAHOGA FALLS, O. U.S.A.

Guaranteed to pass U. S. Government or Railway Companies' Specifications and Inspection. Samples furnished on application. Our latest prices will interest you.

PATTERSON'S NAUTICAL ENCYCLOPEDIA. PRICE, $3.00

Is in all respects a work up to date, correct as to every term known to the shipping world. Sent upon approval. Carriage prepaid.

THE MARINE REVIEW PUB. CO., CLEVELAND.

NAVIGATION SIMPLIFIED.

Not an elaborate technical work—just an assistant for the seaman and a book of valuable plain instruction for beginners.

Contains problems required in examinations that are given by government inspectors to masters and mates of sea-going vessels.

Published by C. E. MacArthur.

CLOTH BINDING, $1.25. PAPER BINDING, $1.00.

THE MARINE REVIEW PUB. CO., 39-41 WADE BLDG., CLEVELAND, O.

CRANE VALVES

ESTABLISHED 1855

LANE & DeGROOT.

METALLIC LIFE BOATS.
(Formerly Raymond's)

Metallic Life Rafts, Cork Life Preservers, e c., approved by the U. S. Supervising Inspectors. Also Wood Boats of every description. Repairing of every kind promptly attended to.

Phone Call 340 B. Greenpoint.

305-315 Vernon Ave., Long Island City, N. Y.

LEWIS NIXON, Shipbuilder.

Office and Works, ELIZABETH, N. J.

Builder of Stern-Wheel, Paddle and Screw Steamers; Also Torpedo Boats and Barges of all kinds in Steel.

A Specialty made of South American and Alaskan River Boats.

WILLIAM R. TRIGG COMPANY, Richmond, Va.

BUILDERS OF

Steamships, Steamboats, Ocean and Harbor Tugs, Steel Barges, Marine Engines and Boilers.

REPAIRS TO ALL CLASSES OF VESSELS.

NOW BUILDING:—U. S. Cruiser Galveston, U. S. Revenue Cutters Tuscarora and Mohawk, U. S. Steel Seagoing Dredge, Steel Tank Steamer for the Standard Oil Co., and several large Tugs for the Pennsylvania Railroad Co. and the New York, Philadelphia & Norfolk Railroad Co.

H. A. J. HELVIG.

MANUFACTURER OF

SHIP LANTERNS and LAMPS.

Carried in stock by the leading ship chandlers, who are in a position to make prompt delivery at bottom prices, also

Side Lights, Bow Lights,
Anchor Lights, Launch Lights,
Binnacle Lamps, Cabin Lamps,
Hand Lamps, Etc.

228 PEARL STREET, NEW YORK.

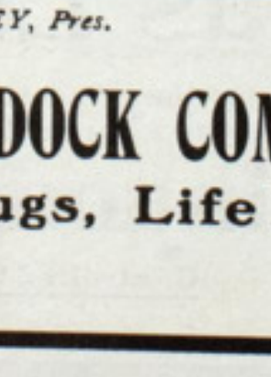
Neversink Cork Jackets and Life Belt.

Warranted 24 pounds. Buoyancy and full weight of Cork, as required by U. S. Inspectors.

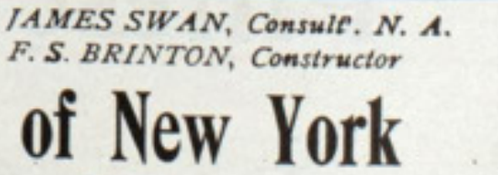
Consolidated Cork Life Preservers. Ring Buoys and Fenders.

SAFEST. CHEAPEST.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



METALLIC and WOODEN LIFE BOATS.



Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact life raft known.

DAVID KAHNWEILER'S SONS.
437 Pearl Street, New York City.
Send for Illustrated Catalogue.

THOS. DREIN & SON.

TATNALL ST. BELOW RAILROAD, WILMINGTON, DEL.

BUILDERS OF METALLIC LIFE BOATS AND RAFTS, YACHTS AND PLEASURE BOATS.

LIFE PRESERVERS.

OUTFIT FOR LAKE STEAMERS A SPECIALTY.

RALPH DERR, Treas.
HAROLD LEE, Secy.

H. NEWTON, WHITTELSEY, Pres.

JAMES SWAN, Consult. N. A.
F. S. BRINTON, Constructor

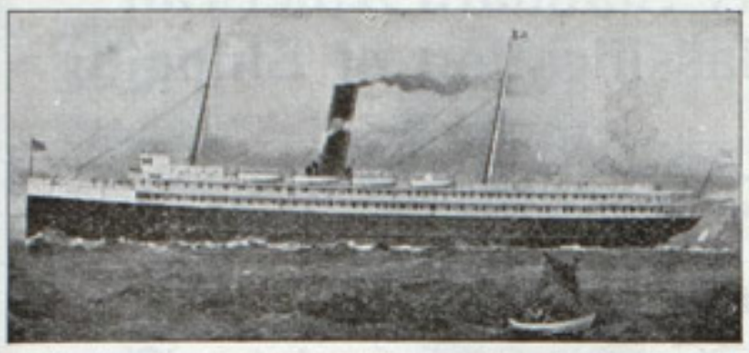
MARINE CONSTRUCTION AND DRY DOCK COMPANY of New York

Steel and Wood Vessels, Yachts, Tugs, Life Boats and Tenders.

Send Specifications and enquiry to—Works: Mariner Harbor, (S. I.) N. Y.
Telephone, 133 West Brighton.

New York Office, 1023 Maritime Building.
Telephone, 3404 Broad.

ROACH'S SHIP YARD.



Delaware River Iron Ship-Building & Engine Works Chester, Pa.

Builders of Steamships and Marine Machinery.

SHIP-BUILDING IN ALL ITS BRANCHES.

NEW YORK OFFICE, MORGAN IRON WORKS Foot E. Ninth St.

Fore River Ship and Engine Co.

Successors to Fore River Engine Co.

Steel Ship and Marine Engine Builders.

CONTRACTORS FOR

U. S. Torpedo Boat Destroyers Lawrence and Macdonough.
U. S. Protected Cruiser Des Moines.
U. S. Battleships New Jersey and Rhode Island.
U. S. Steam Light-Vessel No. 72.

OFFICE AND WORKS, QUINCY, MASS. U. S. A.

The Atlantic Works,

Builders .... of Steamships, Steam Yachts, Tow Boats Etc

EAST BOSTON MASS.

Marine Engines, Boilers and Tanks.
Heavy Machinery and Plate Iron Works
Three Marine Railways.

MARYLAND STEEL CO.

Marine Department,

Ship Builders and Engineers

SPARROW'S POINT, MD.

Baltimore Telephone No. 11 - - - A. G. WILSON, Manager.
Long Distance Telephone Service Between New York, Philadelphia, Boston and Sparrow's Point Offices.
New York Office: 71 Broadway. Boston Office: 70 Kilby Street.
Philadelphia Office: 312-319 Girard Building.

The Pusey & Jones Company,

WILMINGTON, DELAWARE.

BUILDERS OF Iron and Steel Steamers, Steam Yachts, Tow Boats, Marine Engines, Boilers, Tanks, and of Heavy Machinery Generally.

ALSO COPPERSMITH WORK.

Special Facilities for REPAIRS to both WOODEN and METAL Boats

MARINE RAILWAY. NO WHARFAGE CHARGED.

Risdon Iron Works,

IRON and STEEL SHIP BUILDERS

WORKS AT POTRERO, SAN FRANCISCO.

Office and Branch Works. Steuart and Folsom Streets
SAN FRANCISCO.

THE LOCKWOOD MANUFACTURING CO.

EAST BOSTON, MASS.

ENGINEERS AND MACHINISTS.

Builders of STEAMSHIPS, TOW BOATS and MARINE ENGINES

REPAIRING OF HULLS AND MACHINERY.

Baltimore Ship Building and Dry Dock Co.

Ship Building, Dry Dock, Marine Repairs of all Kinds.

470-FOOT SIMPSON DRY DOCK.

Up-Town Office, No. 602 Continental Trust Building, Works and Dry Dock, Locust Point. Baltimore, Md.

J. E. BOTSFORD, President. C. O. DUNCAN, Vice President. F. D. JENKS, Sec'y & Treas.

COLUMBIA IRON WORKS

STEEL SHIP BUILDERS

MARINE ENGINES BOILERS AUXILIARY MACHINERY

ALL KINDS OF REPAIR WORK

PLANT, ST. CLAIR, MICH. OFFICE, PORT HURON, MICH.

MANITOWOC DRY DOCK COMPANY

SHIP BUILDERS

Facilities for Repairs to Steel and Wooden Vessels.

DRY DOCKS AND MAIN OFFICE: MANITOWOC, WIS.
BRANCH YARD: 34 ROBERTS STREET, CHICAGO.

Newport News Shipbuilding AND Dry Dock Co.

SHIP and ENGINE BUILDERS.

Equipped with two large basin dry docks of the following dimensions:

	No 1	No 2
Length on top	610 ft	827 ft
Width on top	130 ft	162 ft
Width on bottom	50 ft	80 ft
Draught of water over sill	25 ft	30 ft

Shops are equipped with modern machinery capable of doing the largest work required in ship construction.

Tools driven by electricity and compressed air used in constructing and repairing vessels.

For estimates and further particulars, address

C. B. ORCUTT, President.

No. 1 BROADWAY, NEW YORK.

Works at Newport News, Va. (On Hampton Roads.)

The Allen Dense-Air Ice Machine

Contains no chemicals, only air. Proven by many years' service in the tropics on United States men-of-war, steam yachts and passenger steamers.

A HUNDRED ARE IN DAILY SERVICE ON STEAMERS.

H. B. ROELKER, 41 Maiden Lane, NEW YORK

Consulting and Constructing Engineer. Designer and Manufacturer of Screw Propellers.

Mathias Seddinger, President. Sommers N. Smith, Vice Pres't. and Gen'l Mgr. ESTABLISHED 1838

The Neafie & Levy Ship & Engine Building Company.

Penn Works.

Iron and Steel Ship and Marine Engine BUILDERS.

Sole Makers of the Well Known
PHILADELPHIA PROPELLER WHEEL.

Beach and Palmer Streets. Philadelphia, Pa., U. S. A.

W. & A. FLETCHER CO.

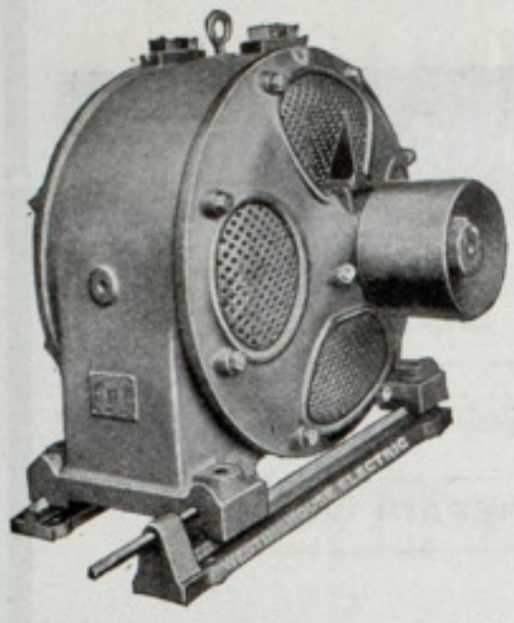
NORTH RIVER IRON WORKS.

MARINE ENGINES, BOILERS, Etc.

Hudson, 12th and 14th Streets, Hoboken, N. J.

Take Ferry from foot of West 14th St., N. Y.

Westinghouse Induction Motors



Greatly reduce the operating expenses of Elevators, Docks and Warehouses, and facilitate the handling material.

Write for Circular 1050.

Westinghouse Electric & Mfg. Co.
Pittsburg, Pa.
Sales Offices in all Large Cities.

MacLean Hydraulic Signal

Best Engine Room Telegraph.

Simple, Powerful, Easily Operated, Sure and Reliable. Last Signal recorded if engineer misunderstands or does not obey signal promptly.

Will not get out of order and needs no readjustment after installing. Can be easily installed. We have whistle and steering signals also for use at either end of the boat; extremely useful and convenient when backing down. For full particulars and illustrations address:

MacLean Hydraulic Signal Co.
317-318 Manhattan Building, CHICAGO.

Buffalo

Wrought Steel Ranges

Are the Best.

Steamboat and Barge Ranges with Rotary Grates.
No Cog Wheels to Warp or get out of order.

Don't take our word for it but ask some one using them.

Russell & Watson, BUFFALO, N. Y.

General Steamboat Work Send for Catalogue.

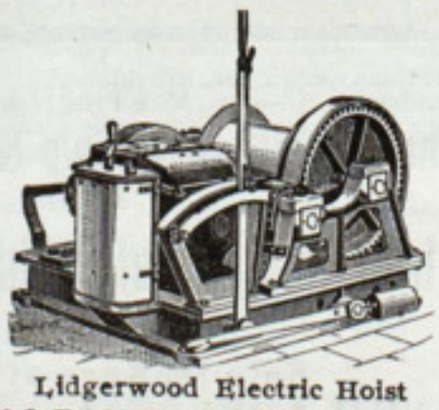
AGENTS—H. C. Weber & Co., Detroit, Mich.
John Black, So. Chicago, Ill.
Pritzlaff Bros., Milwaukee, Wis.

LIDGERWOOD HOISTING ENGINES

OVER 21,000 IN USE.

ELECTRIC HOISTS

Specially adapted for Docks, Warehouses and Steamships.



Lidgerwood Electric Hoist

LIDGERWOOD MILLER MARINE CABLEWAY
will transfer Coal, Ammunition Supplies, etc. from ship to ship at sea.

SEND FOR CATALOGUE.

LIDGERWOOD MFG. CO. 96 LIBERTY STREET, NEW YORK.

Photographs of Ships, Docks, Etc.

We have a pretty thorough list of active vessels, of docks, elevators, coal and ore handling machinery, etc.

The price at which we furnish photographs is very low. If you are interested call or write.

THE MARINE REVIEW PUBLISHING CO.,
39-41 Wade Building, Cleveland.

The Only Standard American Classification of Shipping.

RECORD OF AMERICAN AND FOREIGN SHIPPING. ESTABLISHED 1867. PUBLISHED BY American Bureau of Shipping, New York.

Has Authorized Agents in all the principal ports of the world to protect the interests of its patrons. Vessels built under its rules, or holding certificates of class in this Record of Shipping will, with their Cargoes, insure at lowest rates. Office, 66 Beaver Street, New York.

A. A. RAVEN, President. W. R. T. JONES, Vice President,
W. H. H. MOORE, Treasurer. W. IRVING COMES, Secretary.

SEIDLER-MINER ELECTRIC CO

DETROIT, MICH.

Electric Lighting of Ships

OUR SPECIALTY.

Complete Installations or Reconstruction, Safe, Substantial and Efficient. DEALERS IN

Marine Electrical Supplies and Special Fittings.

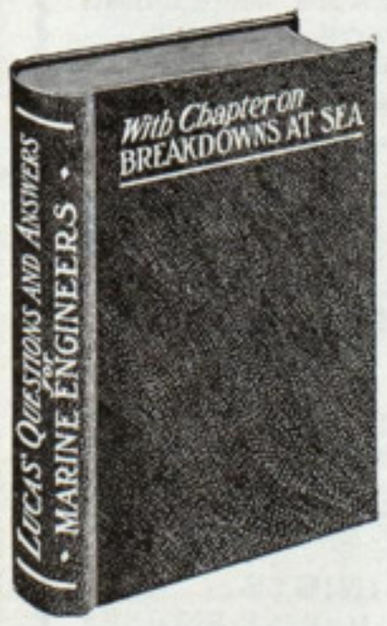
Catalogue and Marine Rules on application

Geo. Stratford Oakum Co.
JERSEY CITY, N. J.
ESTABLISHED 1860
Manufacturers of all grades of

OAKUM.

Spun Cotton.

For sale at Ship Chandlers everywhere.



LUCAS' QUESTIONS AND ANSWERS FOR MARINE ENGINEERS

Contains 516 pages, 807 questions with carefully prepared answers.

MORE THAN A HUNDRED ILLUSTRATIONS.

PRICE, $2.00 POSTPAID

TO ANY ADDRESS. ORDER TODAY.

MARINE REVIEW PUBLISHING COMPANY
39-41 Wade Building :: :: Cleveland, Ohio.

The Ideal Pigment

TRADE MARK

FEROX

REGISTERED JULY 8, 1902

The only adequate protection for Ships, Bridges and Structural Iron and Steel Work.

Mohawk Paint & Chemical Co.

SOLE MANUFACTURERS OF

Patent Iron Oxide Paints

98% Pure

19 Liberty Street, New York.

The only **Pure** Iron Oxide Paint.
The only Non-Crystalline Oxide of Iron.

Being porous and spongy it absorbs and retains the oil and makes a permanent, durable, unchanging, protective coating for wood and metals.

It is rust-proof and not subject to chemical action.
Unequalled for submarine use.

SEND FOR DESCRIPTIVE CIRCULAR.

Chas. E. & W. F. Peck

ESTABLISHED 1870

58 William Street, New York City.
Royal Insurance Building, Chicago, Ill.

C. T. BOWRING & CO., Ltd.
5 and 6 Billiter Ave., LONDON, E. C., ENGLAND,
AND AT "LLOYDS," LONDON.

Insurance Brokers

As brokers we represent ONLY THE ASSURED. Our clients being the VESSEL OWNERS, we refuse to represent insurance companies. We place insurances in the most advantageous market at the best procurable rates and terms. We leave it to the managers and general agents of insurance companies to protect the interests of their companies, maintaining that it is impossible for us to devote ourselves to the interest of both the owners and the insurance companies at the same time.

Average Adjusting Department

Williamson Building. Cleveland, Ohio.

GREAT LAKES REGISTER.

INCORPORATED.

Combined and Issued in Connection with the

BUREAU VERITAS

INTERNATIONAL REGISTER OF SHIPPING.

Great Lakes Register desires to announce that its ratings go before the leading Underwriters of America, England and France.

THE SERVICES OF ITS SURVEYORS MAY BE ENGAGED ON HULL AND CARGOES

F. D. HERRIMAN, SURVEYOR GENERAL,

320-322 Perry-Payne Building, - - CLEVELAND. O,

CRANE FITTINGS

ESTABLISHED 1855

MARINE PAINTING

Is far in advance of house painting. Marine painters know that there is no white pigment except

ZINC WHITE

That will stand exposure under severe conditions.

FREE—Our practical Pamphlets:
"The Paint Question,"
"Paints in Architecture,"
"Specifications for Architects,"
"House Paints: A Common Sense Talk About Them."
"French Government Decrees."

THE NEW JERSEY ZINC CO.,

11 Broadway, New York.

INSURANCE

Geo. L. McCurdy,
169 Jackson Boulevard,
Chicago, - - Illinois.

Direct Representative of Leading American and Foreign Underwriters.

HULLS AND CARGOES.

INSURANCE COMPANY OF NORTH AMERICA.

232 Walnut Street, :: PHILADELPHIA :: Founded A. D. 1792
Fire, Marine and Inland Insurance. Charter Perpetual.

CAPITAL STOCK	$3,000,000.00
Reserve for Reinsurance	4,868,952.10
Reserve for unadjusted losses and other liabilities	845,042.46
Surplus over liabilities	1,988,589.05
Total Assets, January 1, 1902	10,702,583.61

This Company issues certificates of insurance, payable in cases of loss at the option of the assured, in London, Paris, Antwerp, Bremen, Hamburg, Amsterdam, Japan, China and Australia.

CHARLES PLATT, President HENRY W. FARNUM, Marine Secy.

The Donnelly Salvage and Wrecking Co., Ltd.,

JOHN DONNELLY, SR., Pres.
JOHN DONNELLY, JR., Vice-Pres.
H. B. FOLGER, Treas.
THOS. DONNELLY, Secy.

KINGSTON ONT.

DIVERS, STEAM PUMPS, TUGS, Etc.

SUPPLIED ON SHORTEST NOTICE.

THE L. P. & J. A. SMITH CO.

CONTRACTORS FOR PUBLIC WORKS

Dredging,
Harbor Work,
Pile Driving,
Breakwaters,
Dry Docks and
Pier Building.

Railroads,
Canals,
Bridges,
Submarine
Foundations,
Etc., Etc.

Offices: Williamson Bldg., Cleveland, O.

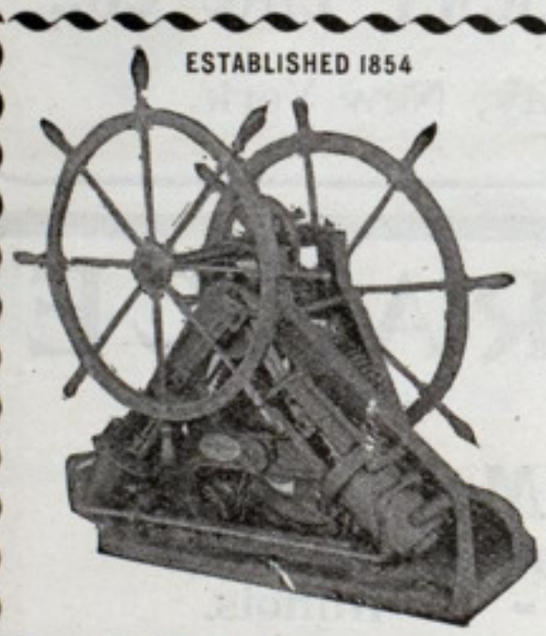
NEW HARBOR CHARTS OF THE LAKES.

Following is a list of harbor charts recently issued from the United States Lake Survey Office, all in colors: Duluth and Superior Harbors, Two Harbors, Ashland, Marquette, Milwaukee, Chicago, Muskegon, Toledo, Sandusky, Cleveland, Lorain, Fairport, Ashtabula, Conneaut, Erie, Dunkirk and Buffalo.

For sale by THE MARINE REVIEW PUB. CO.,

39-41 WADE BUILDING, CLEVELAND, O.

ESTABLISHED 1854



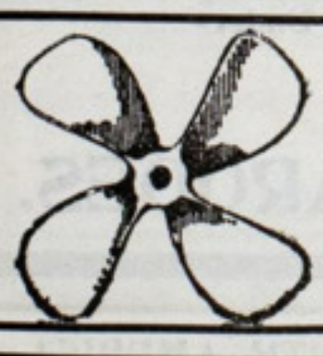
SHERIFFS' STEAM STEERER

For Tug Boat Use

Easy to adjust, and can be handled by any one.

MANUFACTURED BY

SHERIFFS MFG. CO.,
Milwaukee, Wis.



MacKinnon Manufacturing Co.

Boiler Makers, Founders and Machinists.

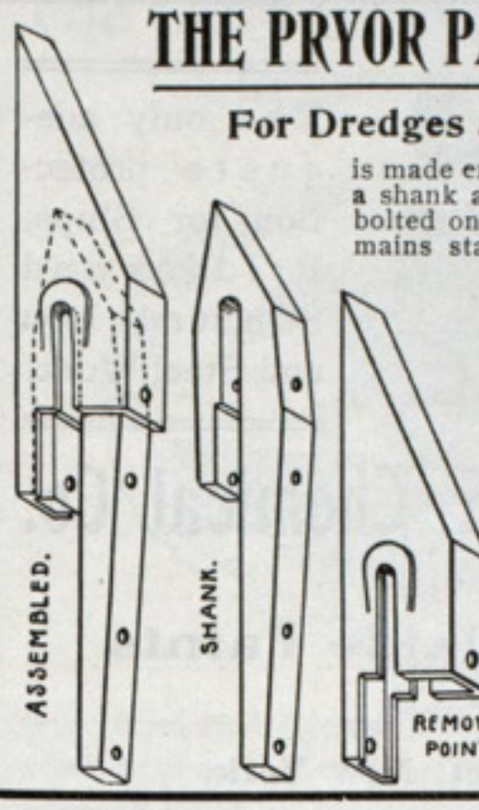
Marine Boilers, Engines and Shipyard Machinery, Most powerful set of Hydraulic Slings on the lakes. Best towing and speed Propeller Wheels made.

SPECIALTY SMALL YACHT WHEELS.

Works & Office, 224-230 N. Water St., BAY CITY, MICH

THE PRYOR PATENT DIPPER TOOTH

For Dredges and Steam Excavators.



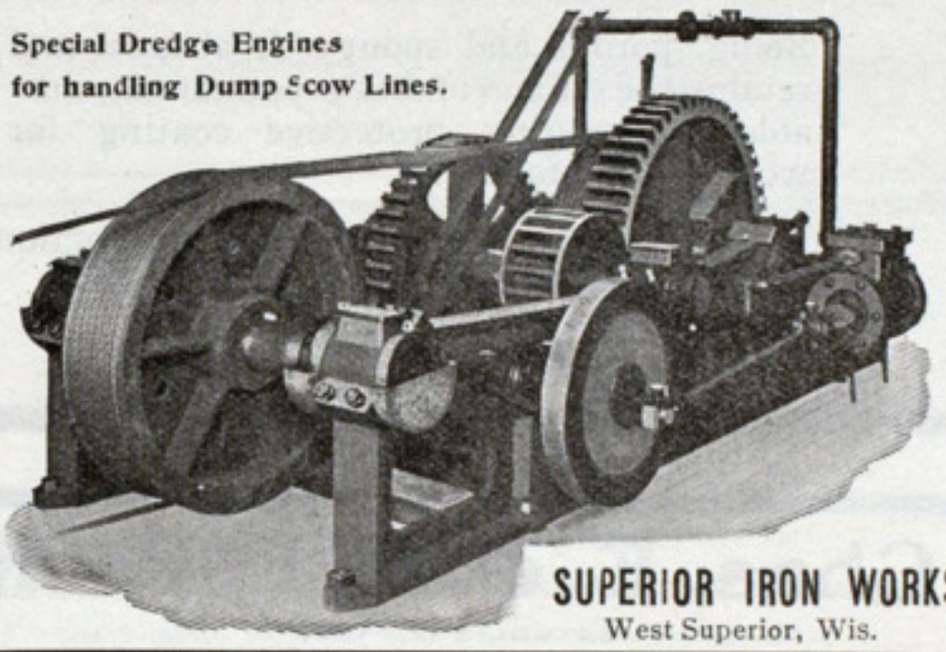
is made entirely of open-hearth steel in two parts, a shank and a removable point. The shank is bolted onto the dipper in the usual way and remains stationary, while the removable point is placed over the shank and is bolted thereto.

A full set of four points can be changed in from ten to fifteen minutes, whereas it takes a much longer time to change a full set of the old-style cumbersome iron teeth. These teeth will wear 100 per cent longer than the iron teeth, steel tipped, and will increase capacity of the dredge materially in hard digging.

The Pryor Patent Excavator Tooth Co.,
HOUGHTON, MICH.

CAR HAULAGE ENGINES

Special Dredge Engines for handling Dump Scow Lines.



SUPERIOR IRON WORKS
West Superior, Wis.

H. G. TROUT,
KING IRON WORKS,

BUFFALO, N. Y.

Manufacturers of

Triple Expansion, Fore-and-Aft

AND

Steeple-Compound Marine Engines,

High and Low Pressure Engines, Sectional Propellers, Tug and Yacht Wheels.....,.

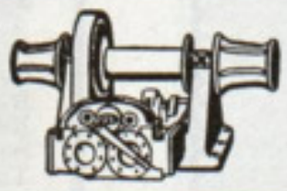
Cowles' Aluminum and Manganese Bronze Propeller Wheels.

These wheels are noted for their extra speed, towing power and proportionate saving of coal.

PRICES QUOTED ON APPLICATION.

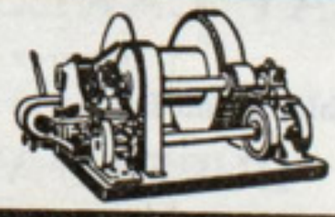
GASOLENE MARINE ENGINES

Suitable for all Boats from 3½ to 200 H.P.
Over 100 in successful use.
Also the well known and always reliable Wootters Gas or Gasolene Stationary Engines.



HOISTING ENGINES

Of all kinds and sizes, and for all purposes, especially for ship use.
Docking and Hauling Engines and Wire Rope Windlasses.



AUTOMATIC TOWING MACHINES

Somewhat the cheapest, and altogether the best. Positively guaranteed.
Automatic Fog Whistle Machines
Steam Steering Engines.

FOR THESE AND OTHER WELL KNOWN SPECIALTIES ADDRESS ALL INQUIRIES TO.

THE CHASE MACHINE CO. Engineers and Machinists, CLEVELAND, OHIO.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street, Cleveland, O.

AIDS TO NAVIGATION

are of vital importance to vessel interests.

SCHERZER ROLLING LIFT BRIDGES

aid navigation and meet with the approval of all vessel interests, because of the wide and unobstructed channel provided for navigation, enabling vessels to pass easily and rapidly through the draw.

THE SCHERZER ROLLING LIFT BRIDGE CO.,

MAIN OFFICES: 1616 MONADNOCK BLOCK,

CHICAGO, U. S. A.

All of the latest and largest LAKE STEAMSHIPS are completely equipped with BLAKE

DUPLEX AND SIMPLEX SPECIAL MARINE PUMPS.

New Marine Catalog ready about July 1st.

Geo. F. Blake Mfg. Co.

114 Liberty St., :: :: :: NEW YORK CITY.

LATEST PATENT ANCHOR

THE NATIONAL

APPROVED BY LLOYDS.

Manufactured by

L. M. BOWERS & CO.,

Binghamton, N. Y.

Catalogue on Application.

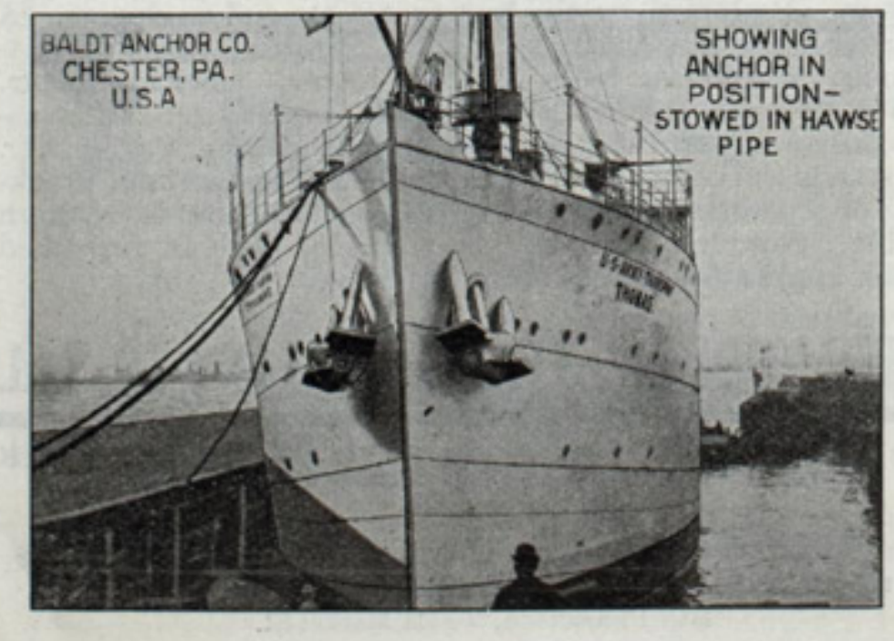
The National and International

ANCHORS.

Furnished to the Lake Trade by

The Upson-Walton Co.,

CLEVELAND, O.



SMOOTH-ON

TRADE MARK

IRON CEMENT No. 1.

Unequalled for repairing leaks or fractures in steam or hydraulic work. This cement is a metallic composition which upon being mixed with water becomes a hard metallic iron that will withstand Steam, Water, Fire or Oil, and expands and contracts the same as iron, which makes it invaluable for boiler patching, making flanged joints, stopping leaking boiler seams, etc. Joints easily taken apart.

Write for free 60 page Illustrated Book.

Smooth-On is for sale by leading supply houses, and is sold in 5, 10 and 25 pound tins.

SMOOTH-ON MFG. CO.

572-574 Communipaw Avenue,

JERSEY CITY, N. J., U. S. A.

De Grauw, Aymar & Company.

ESTABLISHED 1827.

Cordage, Oakum, Vessel and Railroad Supplies.

SOLE MANUFACTURERS IN THE UNITED STATES FOR

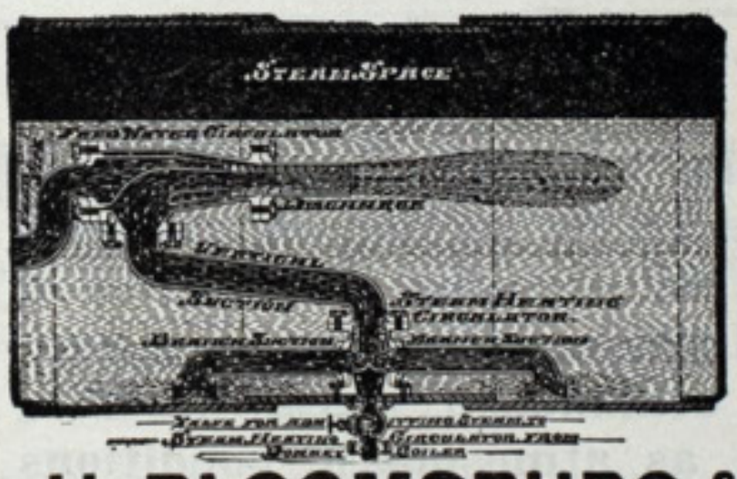
TYZACK'S STOCKLESS ANCHORS.

NEW YORK CITY.

The Equilibrium Circulator and Steam Heating Attachment

Increases Evaporation 5 to 15%

PAYS FOR ITSELF WITH SAVING IN REPAIRS



Keeps all parts of boiler at an even temperature.

No extra joints to leak.

Creates a constant automatic circulation as long as boiler is fed.

106 in use.
50 orders.

H. BLOOMSBURG & CO.,

700 DOLPHIN ST., - - BALTIMORE, MD.

One of these binders, that will hold a complete volume of the

Marine Review

and Marine Record,

will be mailed to any address on receipt of

$1.

THE MARINE REVIEW PUB. CO., 39-41 Wade Bldg. CLEVELAND, O.

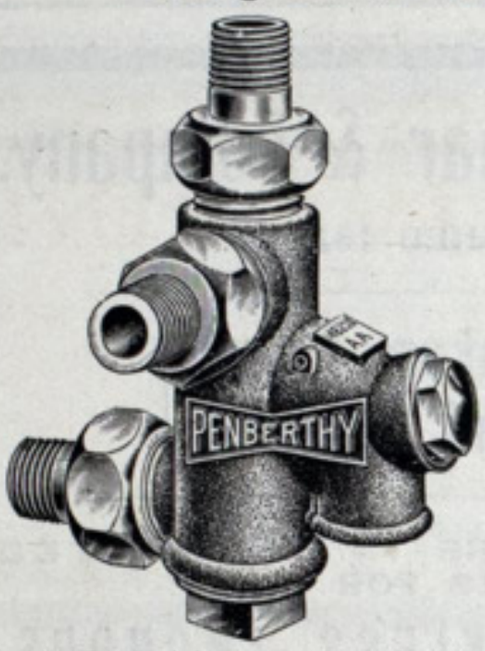
Your Boiler

Is the life of your boat. If it is to do good work it must be well fed. You cannot afford to buy any cheap "Just-as-good" substitute for the World Renowned

TRADE PENBERTHY MARK.

Automatic Injector

Range 20 to 160 lbs. pressure.



Simple
Reliable
Economical
Durable

For sixteen years everywhere acknowledged

The Standard Boiler Feeder of the World.

For high pressure Boilers our "Auto-Positive" Penberthy operates from 20 to 200 lbs. pressure.

PENBERTHY INJECTOR CO. 346-364 Holden Ave. DETROIT, MICH.

Largest Injector manufacturers in the world.

IF IN DOUBT WHAT INJECTOR TO BUY

RUN NO RISK BUT GET THE

U. S. Automatic Injector

Three Safeguards Against Disappointment:

1. Each Injector is carefully tested on varying lifts and pressures before leaving the factory, and a card attached showing its range and grading capacity.
2. Any dealer will guarantee the U. S. Injector, because—
3. We stand back of the dealer, and will replace any Injector that doesn't work rightly, or refund the purchase price, if necessary.

Our guarantee of absolute reliability brings us hundreds of new customers each season. Full particulars and many items of interest are contained in our "Engineers' Pocket Reference Book."

Shall we send a copy?

American Injector Co.,

DETROIT, MICH.

Cabins and Staterooms

of modern vessels, especially those in the passenger service, should demonstrate the supreme possibilities of the wood finisher's art.

This demands a special varnish, however, as atmospheric conditions are more destructive to varnish afloat than ashore and the ordinary article is of but little use.

The varnish best adapted to withstand the deleterious influences of wind, wave and weather is "BERRY BROTHERS' SPAR VARNISH."

Further particulars and a unique marine puzzle sent free for the asking. Write us.

Berry Brothers, Limited,

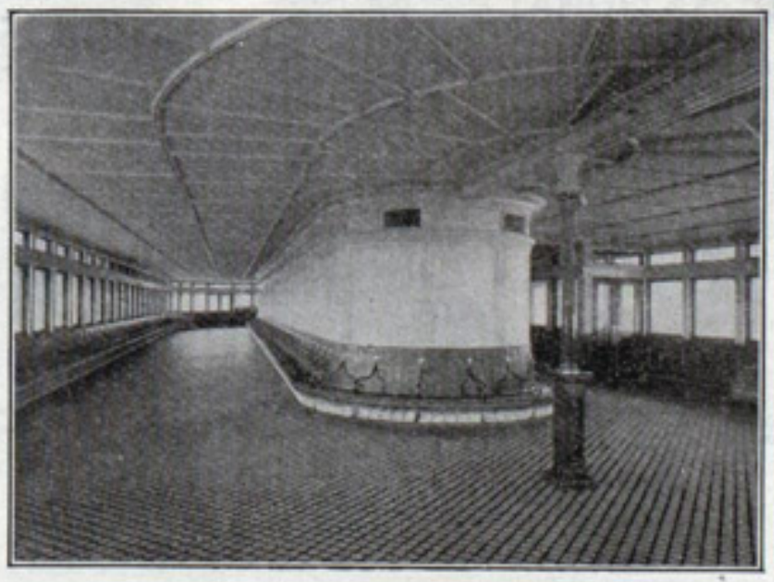
Varnish Manufacturers,

NEW YORK BOSTON PHILADELPHIA BALTIMORE
CHICAGO CINCINNATI ST. LOUIS SAN FRANCISCO

Factory and Main Office,

DETROIT.

INTERLOCKING RUBBER TILING.



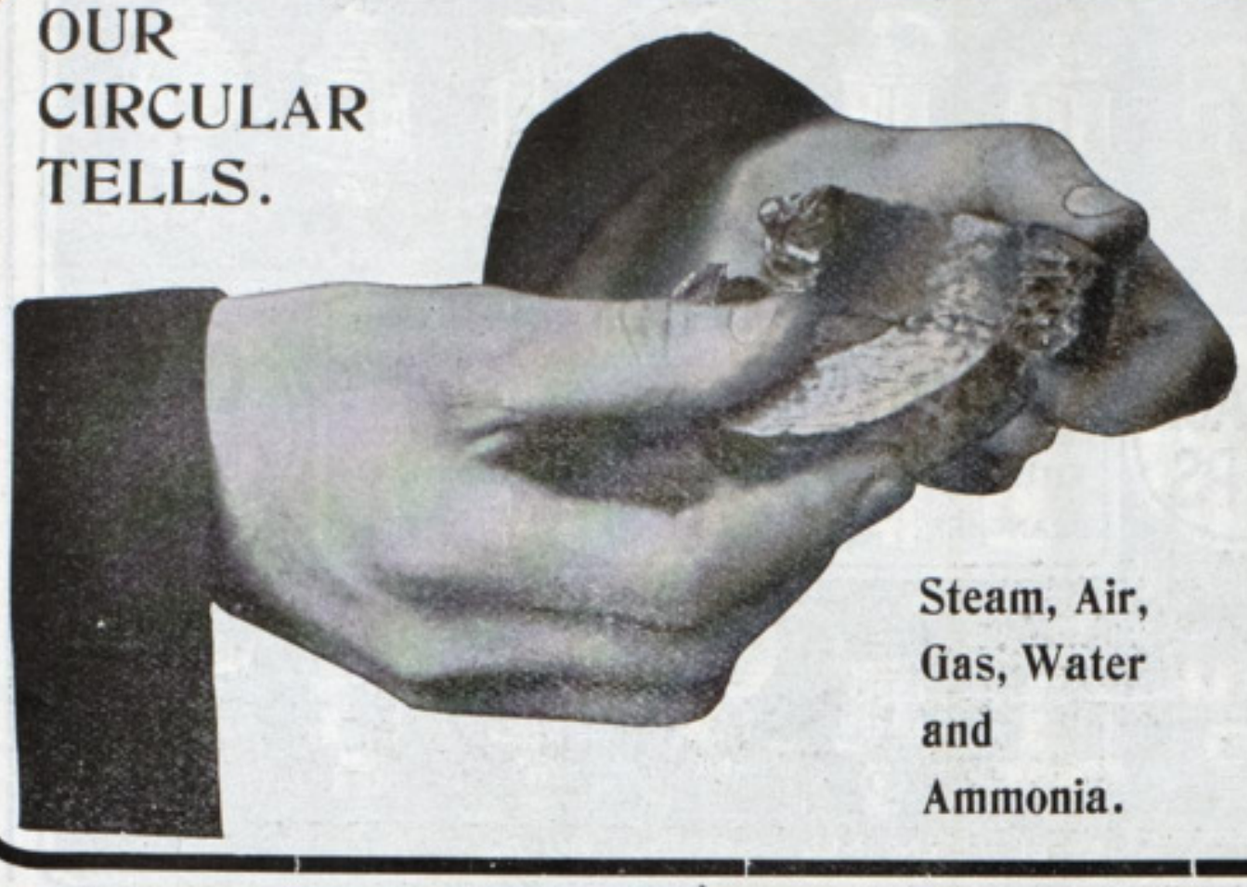
Is noiseless, non-slippery, waterproof and thoroughly sanitary, more durable than stone or earthen tiles, elegant in appearance, manufactured in a carefully selected variety of colors. Endorsed by the best architects and engineers. A perfect floor for business offices, banking-rooms, court-rooms, vestibules, halls, billiard-rooms, smoking-rooms, cafes, libraries, churches, hospitals, hotels, etc. It is especially and peculiarly adapted for Steamships, Yachts, etc. It stands the constant straining and racking without cracking or separating, and its non-slippery feature is of high value. Samples, estimates and special designs furnished upon application. Sole manufacturers.

NEW YORK BELTING & PACKING CO. Ltd.

25 PARK PLACE NEW YORK

PHILADELPHIA, 724 Chestnut St. BOSTON, 24 Summer St.
BALTIMORE, 101 Hopkins Place. INDIANAPOLIS, 229 So. Meridian St.
CHICAGO, 150 Lake St. ST. LOUIS, 411 No. Third Street.
SAN FRANCISCO, 509-511 Market St.

OUR CIRCULAR TELLS.



Steam, Air, Gas, Water and Ammonia.

IN RENEWING

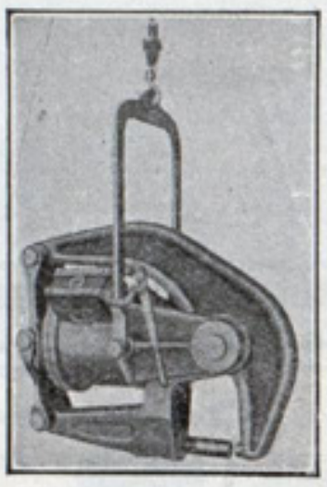
MICA METALLIC PACKING

DON'T

throw away the old, simply add another ring.

AMERICAN METALLIC PACKING CO.
1610 Williamson Building,
Cleveland, Ohio.

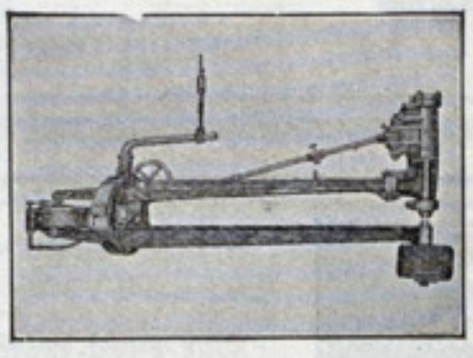
PORTABLE PNEUMATIC RIVETING MACHINES



The following concerns are using our machines:

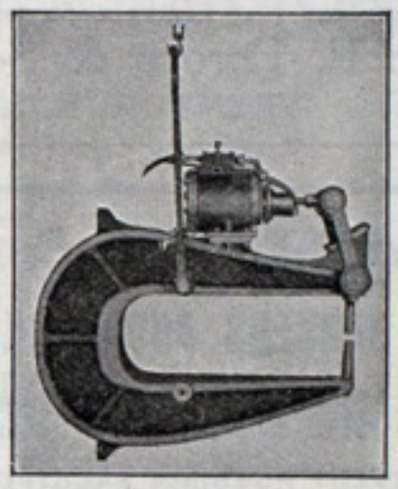
United States Navy Yard, Bremerton, Wash.

United States Navy Yard, Portsmouth, N. H.



New York Ship Building Co. Camden, N. J.

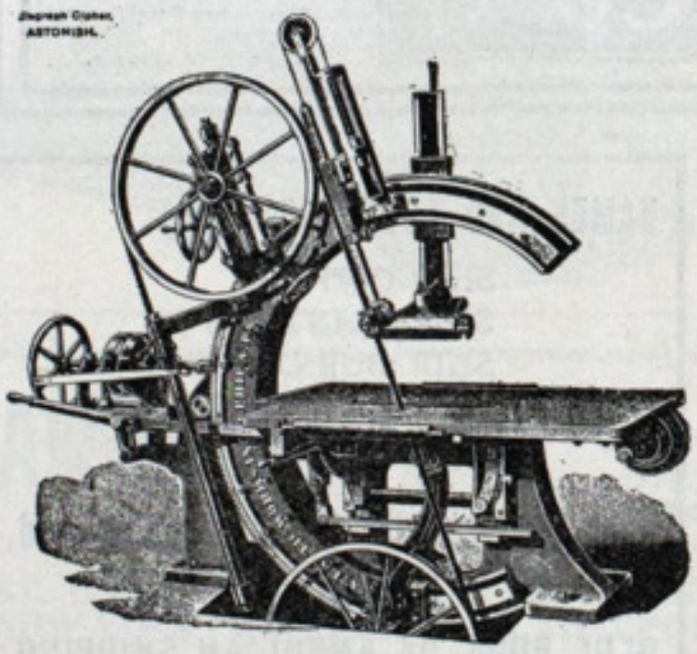
Wm. R. Trigg Co. Richmond, Va.



ESTABLISHED 1872

CABLE ADDRESS, "RIVETERS" W. U. CODE

JOHN F. ALLEN — 370-372 Gerard Ave. — NEW YORK



ADJUSTABLE BEVEL BAND SAW.
Will bevel both ways to 45 degrees.
Power Movement to change angles.
Power feed in three directions.

ESTABLISHED 1869. INCORPORATED 1896.

ATLANTIC WORKS INCORPORATED,

Successors to Berry & Orton Company.

2223-25-27-29 Arch St., Philadelphia, Pa., U.S.A.

MANUFACTURERS OF

MACHINERY FOR WORKING WOOD

FOR USE IN

Ship Yards, Car Shops, Railroad Shops.

SEND FOR CATALOGUE. ESTIMATES FURNISHED.

Hollow Chisel Mortisers. Car Sill Dressers.

A BINDER In which to bind your REVIEW each week

can be had for $1 00 from The Marine Review Pub. Co., 39-41 Wade Building, Cleveland, O.

C. H. McCutcheon,

Copper, Tin and Sheet Iron Marine Work. Engineers' Supplies.

Brass Cocks, Globe Valves and Couplings, Iron Pipe Fittings and Supplies, Rubber Hose, Packing, Springs, Usudurian Packing.

Buffalo, N. Y.

The Blue Book of American Shipping

The only Marine Directory of the United States containing names and addresses of Ship Owners, Ship Masters, Ship Builders, Naval Architects, Marine Engineers and of every interest active in the Shipping Fie'd. Also Statistics of Shipping and Ship Building in America. :: :: :: :: :: :: :: Sent on approval

Marine Review Publishing Company, 39-41 Wade Building, Cleveland, Ohio.

Price $5.00

We offer an

Engine for Direct-Connected Electric Plants.

which we can guarantee

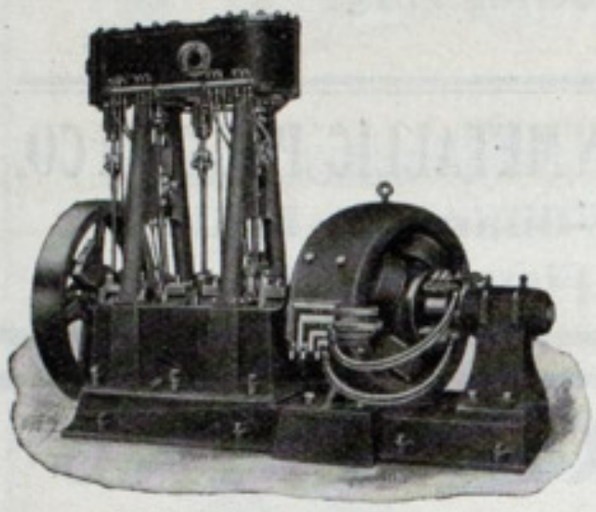
to stand up under extreme changes from no load to full load, and to REGULATE TO PERFECTION.

That its construction is strong is self-evident.

The shaft, rods, valve stems and other working parts are made of forged steel.

Every bearing is automatically lubricated.

In finish it is all that can be desired.



WRITE FOR FULL PARTICULARS AND TESTS.

John E. Thropp & Sons' Co.

TRENTON, N. J.

FAHEY & CO.

BANKERS AND BROKERS,

1011-1015 THE WILLIAMSON BLDG.

TELEPHONE, MAIN 2754. - CLEVELAND, O.

EVERY POSSIBLE FACILITY FOR CONDUCTING A BROKERAGE BUSINESS IN

Stocks, Bonds, Grain, Etc.

Chas. Cory & Son,

Manufacturers of

Mechanical and Electrical Telegraphs and Indicators.

Engine Bells and Electric Call Bells.

278-279 Division St.

NEW YORK CITY.

Queen City Patent Hydraulic Steerer.

The BEST and MOST RELIABLE.

Has Large Hand Wheel.

Can be Changed from Power to Hand Steering Instantly.

A Favorite with Pilots.

SEND FOR REFERENCES

QUEEN CITY ENGINEERING CO., Buffalo, N.Y.

Use Grease or Oil and Lunkenheimer Cups

and you will have bearings lubricated to your entire satisfaction. **Endorsed by millions of satisfied users.** Specify them and order from your dealer. Write for catalog of Brass and Iron Engineering Appliances of superior quality.

THE LUNKENHEIMER CO., Cincinnati, O.

BRANCHES { NEW YORK: 26 Cortlandt Street. LONDON: 35 Great Dover Street, S. E.

NO OIL lubricant is a perfect lubricant for heavy machinery. A solid lubricant is required. No solid lubricant is at once so durable and so smooth as Ticonderoga Flake Graphite. Only Ticonderoga Flake Graphite is used in Dixon's Graphite Lubricant. Ask for booklet 77-c.

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

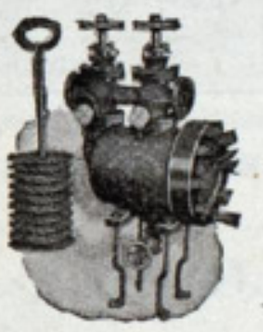
WATER FILTERS REGULATORS & ENGINES

We make **Pressure Regulating Valves** for all purposes, steam or water.

Our **Feed-Water Filter** will keep oil out of your boiler.

We can interest you if you use a condenser.

Water Engines for Pumping Organs



THE ROSS VALVE CO. TROY N.Y.

Keep Oil out of your Boiler with the

FEED-WATER FILTER

For Marine and Land Service

Two of these Filters are in use on the Oceanic.

FARNAN

Brass Works

CLEVELAND, O.

23 Center St. (near the bridge.)

OIL PUMPS, WHISTLES, GOVERNMENT PLUGS, ETC.

MARINE WORK TO ORDER.

NAMES AND ADDRESSES OF

SHIP OWNERS
SHIP MASTERS
SHIP BUILDERS
NAVAL ARCHITECTS
MARINE ENGINEERS

AND OF

Every Interest Active in the Shipping Field,

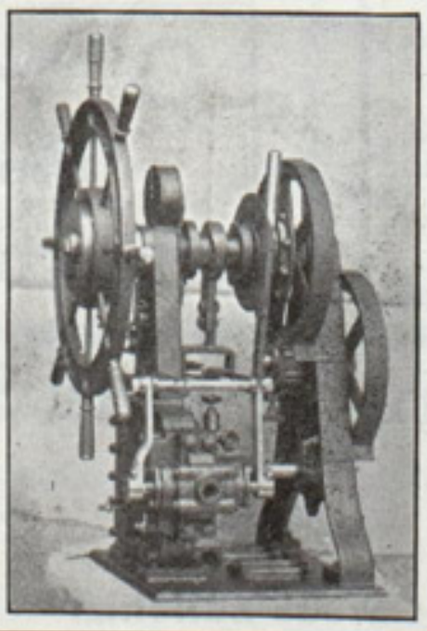
Invaluable for Circular Purposes,

Are found in the

BLUE BOOK OF AMERICAN SHIPPING.

Sent on Approval, Carriage Prepaid.

MARINE REVIEW PUB. CO., CLEVELAND, O.



THE DAKE PILOT HOUSE STEAM STEERER.

A Simple Compact and Durable Machine. Occupies Small Floor Space.

Write for descriptive circulars and prices.

MANUFACTURED BY

The Dake Engine Co.,

GRAND HAVEN, MICH.

You send the Water—We made Analysis, we make the treatment. Then if you use it regularly and give the boilers ordinary care, we will all be satisfied—A gallon of water is required.

DEARBORN DRUG & CHEMICAL WORKS

27-34 Rialto Building, CHICAGO, ILL. WM. H. EDGAR, PRESIDENT. Telephone Harrison 3930 and 3931

CRAIG SHIP BUILDING CO.

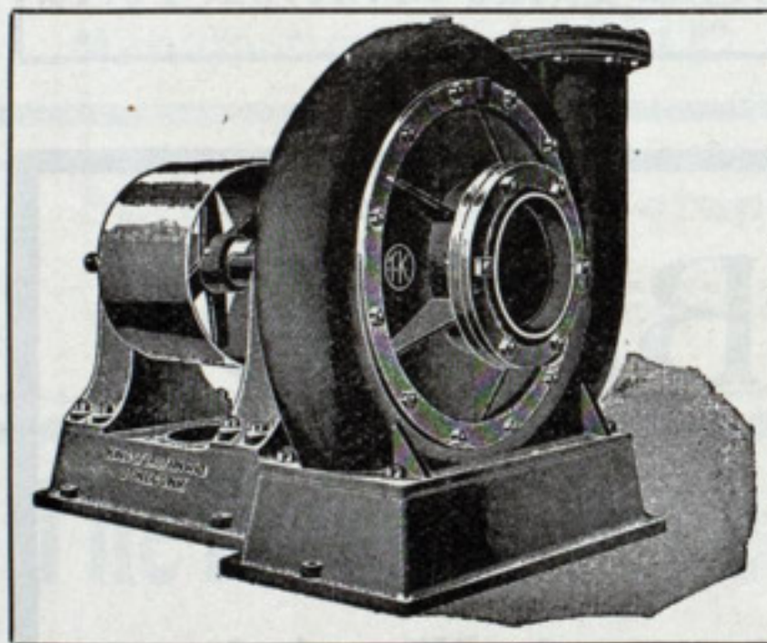
TOLEDO, OHIO.

METAL - AND - WOODEN - SHIP - BUILDERS.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships

A SPECIALTY.



DREDGING, WRECKING CIRCULATING AND BALLAST PUMPS.

MARINE BOILERS.

Kingsford Foundry & Machine Works,

OSWEGO N. Y.

MOTT'S

"RICHMOND" PUMP CLOSET.

The "Richmond" is the simplest, quickest and easiest working Closet made. It has been endorsed by all who have seen it. We also manufacture a full line of Baths, Lavatories and other Sanitary goods for Marine Work.

The J. L. Mott Iron Works,

84-90 Beekman St., NEW YORK CITY.
332 Boylston St., BOSTON, MASS.
1128 Walnut St. PHILADELPHIA.

Our New Marine Catalogue is Now Ready for Distribution.

AMERICAN LINE NEW YORK SOUTHAMPTON LONDON

CALLING AT CHERBOURG WESTBOUND.

Sailing From New York Every Wednesday at 10 A. M.

ST. LOUIS (11,629 tons), ST. PAUL (11,629 tons), NEW YORK (10,674 tons), PHILADELPHIA (10,433 tons)

Special Express Train from Southampton to London in one hour and forty minutes. Close connection at SOUTHAMPTON for Havre and Paris by special fast twin-screw Channel Steamers.

RED STAR LINE NEW YORK ANTWERP PARIS

Sailing Every Saturday at 10 A. M.

FINLAND (12,760 tons), KROONLAND (12,760 tons), ZEELAND (11,905 tons), VADERLAND (11,899 tons).

One of the Shortest Routes to BELGIUM, HOLLAND, FRANCE, GERMANY, THE RHINE, SWITZERLAND and ITALY.

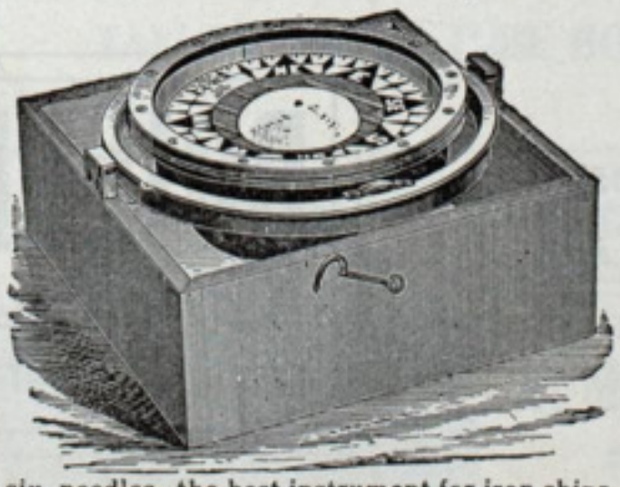
Send for "Facts for Travelers."

Office, Empire Building 73 Broadway, New York.

305-307 Walnut St., Philadelphia.
Fiske Building, 89 State Street, Boston.
306 F St., N. W., Washington, D. C.
Cor. Dearborn & Washington Sts., Chicago.
Third and Pine Streets, St. Louis.
10-12-14 Washington Ave., S., Minneapolis.
30 Montgomery St., San Francisco.

PIERS: 14 & 15 NORTH RIVER, FOOT OF FULTON ST., NEW YORK.

RITCHIE LIQUID COMPASS



The Standard Liquid Compass. Used Exclusively by the United States Navy For Over 35 Years.

Over 25,000 Used in Merchant Service.

Made in all sizes and styles, from 2 to 12 inches diameter of card. All compasses made by us have our name printed below the North point, or prominently upon the card. NONE OTHER ARE GENUINE. Latest form with four or six needles, the best instrument for iron ships. For sale by ship chandlers and nautical instrument dealers.

CATALOGUE FREE.

E. S. RITCHIE & SONS,

Manufacturers of Nautical and Physical Apparatus,

BROOKLINE, MASS., U. S. A.

HARDY'S S.S. METAL.

THE MOST DURABLE AND SATISFACTORY BABBITT METAL FOR MARINE SERVICE

TRADE MARK WW — HARDY — S.S. METAL

FACSIMILE OF INGOT

HAS STOOD THE TEST OF 30 YEARS.

MANUF'D SOLELY BY WM. A. HARDY. FITCHBURG, MASS. U.S.A.

TELEPHONE WEST 244. RESIDENCE, 183 LAWN ST.

LAKE ERIE BOILER WORKS,

J. J. KEENEN & SONS, PROPRIETORS.

Boilers, Tanks and Sheet Iron Work, Coal and Ore Buckets.

REPAIRING A SPECIALTY.

Also Flues Taken Out, Placed and Reset, New Flues always in Stock.

COR. ELM AND HEMLOCK STS., CLEVELAND, O

PHOSPHOR BRONZE

REG TRADE MARKS

"Phosphor Bronze" DELTA

THE PHOSPHOR BRONZE SMELTING CO. LIMITED, 2200 WASHINGTON AVE., PHILADELPHIA.

"ELEPHANT BRAND PHOSPHOR-BRONZE"

INGOTS, CASTINGS, WIRE RODS, SHEETS, ETC.

—DELTA METAL—

CASTINGS. STAMPINGS AND FORGINGS.

ORIGINAL AND SOLE MAKERS IN THE U.S.

DELTA METAL

SHIP OWNERS AND MASTERS

For the protection of your property on the lakes, whether steam or sail, always have on board your craft a barrel of

"Vacuum Sea Oil,"

the merits of which are appreciated as a result of the experience of the principal shipping people of the ocean and lakes.

STANDARD OIL CO.,
of New York.
MARINE OIL DEPARTMENT.

Stocks Carried at the Principal Ports.

NATIONAL TUBE CO.,

MANUFACTURERS OF

Seamless Cold Drawn Steel Tubing

IN ALL SIZES FROM 1-8 TO 16 in. DIAMETER.

Stay Tubes,
Water Grates,
Compressed Air
and High Steam
Pressures.

BOILER TUBES

FOR ALL CLASSES
OF MARINE WORK.

Hollow Shafts,
Bushings,
Hydraulic Tubes,
Etc., Etc.

SALES OFFICES:

Havemeyer Building, New York.
Frick Building, Pittsburg.
Western Union Building, Chicago.
267 So. Fourth St., Philadelphia.
420 California St., San Francisco.

FOREIGN OFFICES:

Dock House, Billiter Street
London, E. C., Eng.

THE BABCOCK & WILCOX COMPANY.

NEW YORK and LONDON.

FORGED STEEL

MARINE BOILERS

283,000 Horse Power in the United States Navy. **136,300 Horse Power in the British Navy.**

200,000 Horse Power in the American Merchant Marine

RECOMMENDED BY

BOILER COMMITTEE, APPOINTED BY

LORDS COMMISSIONERS OF BRITISH ADMIRALTY.

FOR

LARGE CRUISERS AND BATTLESHIPS.

No Cast Metal. No Screwed Joints. No Automatic Devices.
No Bent Tubes. Lightness. Safety Under High Pressure.
ACCESSIBILITY.

For High-Grade Installations in the Navy and Merchant Marine

THE NICLAUSSE BOILER

609,000 Horse Power in the Navies of

ENGLAND, UNITED STATES, FRANCE, GERMANY, JAPAN, RUSSIA, ITALY, SPAIN, TURKEY, CHILE, ARGENTINE REPUBLIC.

105,000 HORSE POWER IN THE UNITED STATES NAVY.

Manufactured by THE STIRLING COMPANY, CHICAGO, ILL.

Screw Propeller Computer

(McDERMOTT)

For quickly determining dimensions and proportions of screw propellers for any set of conditions.

$5.00

The Roberts Boiler Co.

Has Built Nearly 1,500 Boilers to Date.

For Launches, Yachts, Passenger and Freight Steamers, Dredges, Tugs, Stern-wheelers, Canalers;
Also for Navy Department, War Department, Treasury Department, Light-House Board and Revenue Cutter Service;
Also for N. Y. Dock Department and U. S. Supervisor, Harbor of N. Y.

SAFETY AND ECONOMY.

Never killed a man or had a serious accident. $250,000 capital. Works covering 29,000 square feet of ground. Never had a boiler returned on account of dissatisfaction. Every boiler warranted. All material made specially for our use. All boilers tested at 500 pounds hydrostatic pressure and 250 pounds of steam before shipping. Workmanship strictly first-class. All joints screwed and reliable. No expanded joints. State your requirements and we will furnish specifications. Correspondence solicited.

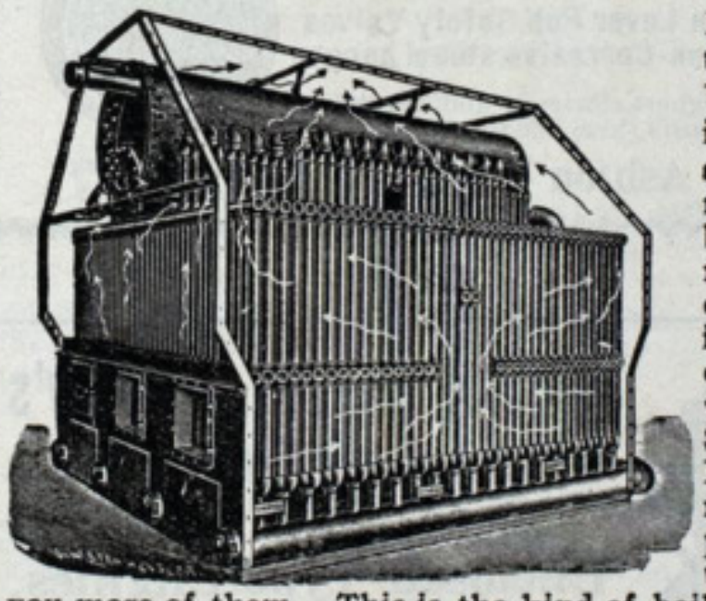
The Roberts Safety Water-Tube Boiler Co.

Works, Red Bank, N. J.

39 and 41 Cortlandt St., NEW YORK CITY.

TELEPHONE: { NEW YORK OFFICE, 599 CORTLANDT. / OFFICE OF WORKS, 49 RED BANK, N. J. } Cable Address, "BRUNIVA, N. Y.

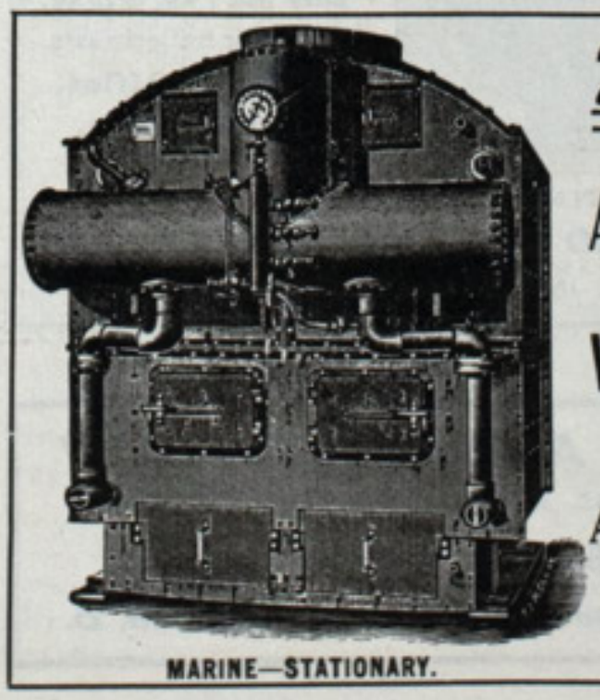
It's Easy to Catch Your Eye



But we want you to think. The Taylor Water Tube Boiler is daily proving itself the most economical and durable boiler on the market. Light, compact, powerful, it never primes and carries as steady a water line as a Scotch Marine. Look at the cut and notice the good points; then write us and we willshow you more of them. This is the kind of boiler you can use 24 hours a day year in and out. Just the thing for that new tug.

TAYLOR WATER TUBE BOILER CO.,

400 Franklin St., DETROIT, MICH.



MARINE—STATIONARY.

250 STEAM VESSELS

NOW EQUIPPED WITH

ALMY'S PATENT SECTIONAL Water-Tube Boilers

BEAR EVIDENCE OF THEIR

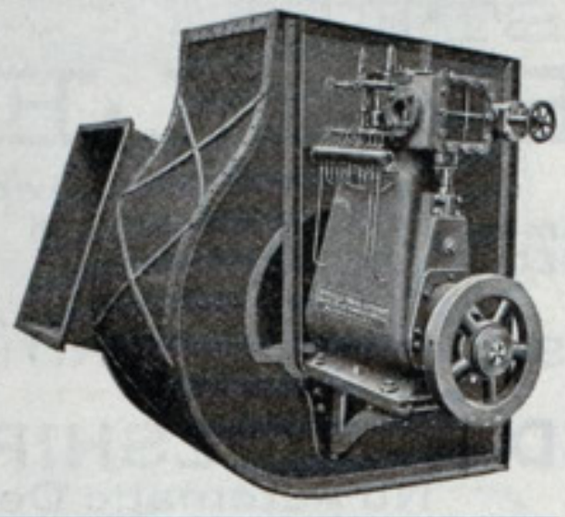
Excellent Qualities

ALMY WATER-TUBE BOILER CO.

PROVIDENCE, R. I.

Buffalo Steel Plate Fans

for Forced Draft and Ship Ventilation.

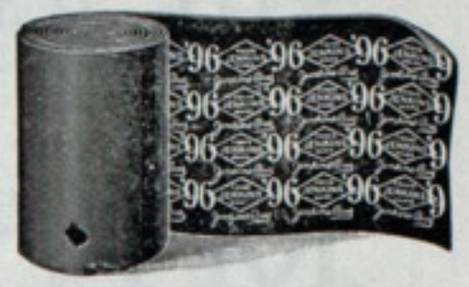


Operation Positive
and Uniform
Regardless
of Weather Conditions

Write for Catalogue

Buffalo Forge Company
BUFFALO, N. Y.

Makes
Perfect
Joint
Instantly



Jenkins '96 Packing

Can be placed in a joint that is either hot or cold and full steam pressure may be turned on at once. It will also pack joints with rough surfaces equally as well as when they are faced. It does not deteriorate.

Do not accept unless stamped like cut.

JENKINS BROS., New York, Boston, Phila., Chicago.

The Shipowners Dry Dock Co.,

CHICAGO.

Repairs to Steel and Wooden Vessels.

Three Docks at Halsted Street and North Branch.

OFFICES, RIALTO BUILDING.

OFFICE TELEPHONE, HARRISON 1020.
YARD TELEPHONE, NORTH 1659.

W. W. WATTERSON, Supt.
TELEPHONE, LAKEVIEW 198.

ASHTON

Cam Lever Pop Safety Valves
and Non-Corrosive steam gauges

give highest efficiency and durability.
Specify them and get the best.

The Ashton Valve Co., Boston, New York and Chicago, U. S. A.

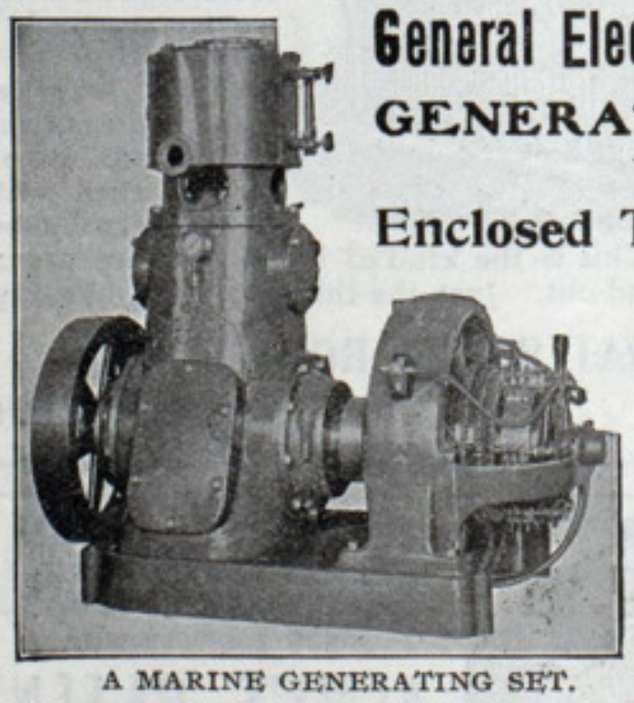
THE
BOURNE-FULLER CO.

IRON, STEEL
and
PIG IRON.

Cleveland, O.

Genuine Iron Sheets guaranteed to be made from re-worked muck-bar and containing NO SCRAP.

General Electric Company's
GENERATING SETS
WITH
Enclosed Type Engines.



Have automatic forced lubricating, which reduces wear and attention to a minimum and insures quiet operation.

Sizes from 7 KW. to 25 KW.

Write for Bulletin 4272.

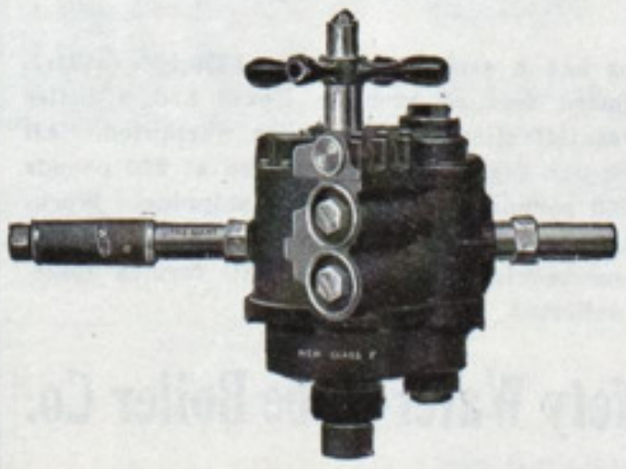
General Office,
Schenectady,
New York.

A MARINE GENERATING SET.

Cleveland Office, 310 New England Building.

SALES OFFICES IN ALL LARGE CITIES.

Hand Book of ADMIRALTY LAW
By Robt. M. Hughes.
$3.75.
Marine Review Pub. Co., - - Cleveland, O.



AIR
COMPRESSORS

Built in all Capacities

Complete Air Plants Installed.

Pneumatic Appliances of Every Description.
WRITE FOR CATALOG.

CHICAGO PNEUMATIC TOOL CO.
General Offices: Fisher Bldg., CHICAGO. Eastern Office: 95 Liberty St., NEW YORK.